The Builder.

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ILLUSTRATIONS.

Design for a Stone Dome over a Porte Cochère to a large Public Hall (Grissell Medal, R.I.B.A., 1903) .....By Mr. J. B. Fulton.
Aldershot Council Offices .....Mr. C. E. Hutchinson, A.R.I.B.A., Architect.
Some Furniture at the Arts and Crafts Exhibition .....From Photographs.

Blocks in Text.

Diagrams Illustrating Method of Ventilation ..... Pages 212 and 213
Illustrations to Student's Column ..... Pages 232 and 233
Design for a Domed Porte-Cochère: Plan..... Page 226

CONTENTS.

Housing Problem 211
Air Without Draughts 212
..... 213
to Estimate 215
Architectural Association 216
Carpenters' Hall Lectures 222
The Architectural Association Spring Visits 223
The London Master Builders' Association 223
The London County Council 225
Competitions 225
Illustrations:—
Design for a Domed Porte-Cochère 22
Aldershot Council Offices, Fire Station, and Town Hall 226
Some Furniture from the Arts and Crafts Exhibition 226
The Surveyors' Institution 226
Architectural Societies 229
Archæological Societies 229
Engineering Societies 230
Builders' Clerks' Benevolent Institution 230
Applications under the London Building Act, 1894 230
Manchester City Council and the Fair Contracts Clause 230
The London Building Acts (Amendment) Bill 231
Metropolitan Asylums Board 231
Books Received 231
Correspondence:—
New Art in Stained Glass 231
King's College and Somerset House 232
"L'Art Nouveau" 232
The Student's Column.—Builders' Tools and their Uses 232
General Building News 233
Foreign 4
Miscellaneous 234
Legal:—
Building Dispute at Ealing 235
False Trade Description 235
Harrogate Building Dispute 235
Patents of the Week 36
Meetings 236
Some Recent Sales of Property 237
Prices Current of Materials 237
Competitions, Contracts, and Public Appointments 238
Tenders 239

The Housing Problem.

THE recent debates in the House of Commons on the Address with reference to the Housing Question have been of singularly little value. On the one hand, various Members of Parliament have enunciated views on the Housing Question which have over and over again been repeated in different forms in the public Press. On the other hand, the President of the Local Government Board obliged the House to listen to a large number of well-intentioned platitudes. The net result, therefore, of these discussions is that things will remain in their present state. So much is now heard of what is called Municipal Trading that public attention is being somewhat more directed to the question of municipal ownership of working men's dwellings. As we have often said, it is impossible to form a true judgment upon the profit or loss of these undertakings in the hands of Municipalities without an impartial investigation by a Royal Commission. One thing, however, is pretty clear, the Legislature has sanctioned the erection of buildings for artisans by Municipalities, and it is therefore wholly improbable that they will ever be prohibited from carrying out such works. At the same time, Municipalities are under the control of the ratepayers, and if the latter in large numbers object to the Municipal ownership of working-men's dwellings, Local Authorities can in this manner be prevented from building them.

It is pretty clear, however, that even if municipalities do continue to erect these structures, they can scarcely be said to be competing with private enterprise, because, after all, as far as London is concerned, the work done by the County Council is very small in comparison with that executed by private persons. In a useful work* recently published and which examines the figures of the last census, it appears that in Greater London additional houseroom was provided during the ten years 1891-1901 for 1,014,000 persons, and that at a capital expenditure of 250*l.* a family, that is reckoning the family at 4·4 persons, the sum expended exceeded 57,000,000*l.* The County Council, however, has only provided accommodation for 15,000 of this number of persons, and has spent, to the end of 1901, 1,281,000*l.* Reckoning, says Mr. Parsons, the family at the above average, the Council has spent in housing each family 374*l.*, which is higher than the cost of the voluntary builders.

In the same work we are presented with some figures which seem to show that the housing question is in a more satisfactory condition than is often supposed. The general public are more sympathetic than they were fifty years ago, or one might even say a quarter of a century ago, and although there is much improvement needed, it must not be supposed that England, whether in the rural or urban districts, has been standing still. The total number of separate tenements in the County of London in 1891 was 937,006, and in ten years it has risen to 1,019,546, such increase being equal to 8·7 per cent. The rate of increase of population during the same time was 7·3 per cent. The increase in the tenements containing five or more rooms was equal to 13·2 per cent., while the increase in those with less than five rooms did not exceed 6·6 per cent. "The rate of increase in the larger tenements was, therefore, double that shown in smaller tenements." Again, there is a decline in the number of single-room tenements in which more than three persons were enumerated. All these figures, and others which space will not permit us to quote, show that, however bad overcrowding may be in many parts of the Metropolis, the general condition of the people during the last ten years has, with regard to habitations, distinctly improved.

The same characteristic is, as we have said, visible in the country. Thus, if we take the county of Buckingham, which may very well be regarded as a typical rural district, we find from the census figures which have recently been issued, that whilst in 1891 there were 18,916 tenements of less than five rooms, in 1900 the number had declined to 16,077. In the same way the proportion of persons per tenement had declined. Thus, whilst in 1891 there were 153 tenements with ten persons for each, in 1901 there were only 102, and this, although the total number of tenements had increased from 41,000 odd to 44,000 odd.

As we are upon the subject of the rural districts, we may say at once, from what transpired in the debate and from what is general knowledge, that there is great disinclination on the part of the local authorities to take any public action towards improving the dwellings of the working-classes, and it would appear that such improvements can only take place from two causes. The first is an increase in the rate of wages of agricultural labourers and kindred persons, so that they can afford to pay a rent for cottages which will give the cottage owner a reasonable percentage on his outlay. The second is the prevention of restrictions on cheap yet serviceable buildings. There is no reason whatever why well built wooden cottages should not be just as sanitary and desirable residences as badly built brick ones, and it is the vexatious restrictions of local authorities to which is largely due the difficulty of finding house accommodation in the country districts. Of course, could there be greater facilities for the purchase of small plots of land, and for the borrowing of money by agricultural labourers, the problem would in this way be to some extent solved. In the great towns the demand for dwellings must, it is clear, be generally met by voluntary enterprise, and the more that the wage-earner is given facilities for purchasing and building his own dwelling-house, the more rapid will be the increase in the town habitations; but in the cities the problem is also intermingled with that of communication. But even with all these difficulties ahead, it is pretty clear that the state of the dwellings of the working classes will improve within the next ten years as it has during the past decade.

* "Housing by Voluntary Enterprise." By James Parsons. London: P. S. King & Son. 1903.

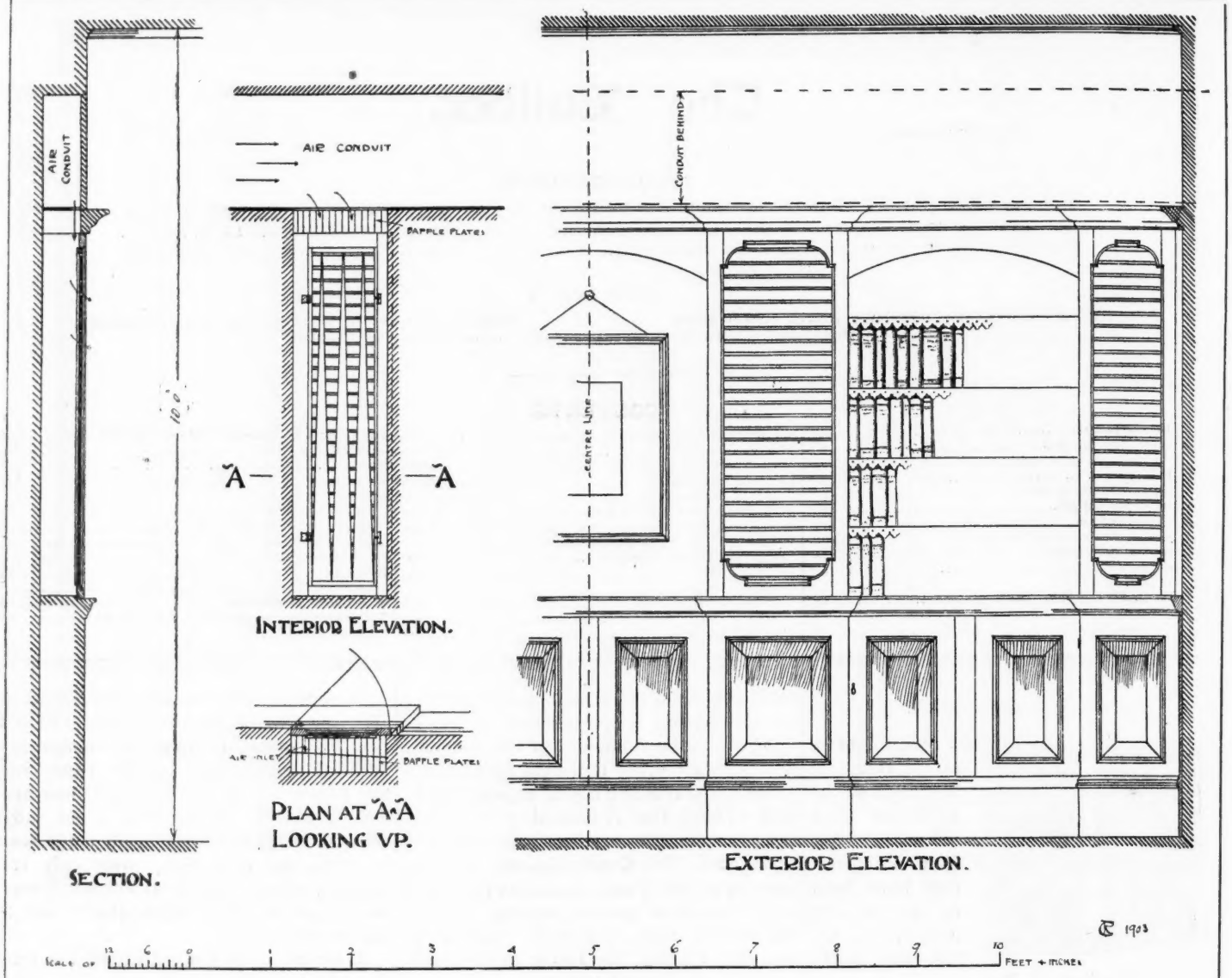


Fig. 1.

PURE AIR WITHOUT DRAUGHTS.

REFERENCE has already been made in these columns to a lecture on the above subject given by Dr. T. Glover Lyon at the Camera Club Rooms, Charing Cross-road, on January 12. We are now able to publish some illustrations which will serve to show more clearly the method of ventilation he has invented, and which in the practical demonstration given to the Camera Club appeared to be most successful.

Dr. Lyon has pointed out that the most serious effects of bad ventilation are caused by the appearance of exhaled substances of unknown constitution which "are virulent poisons resembling ptomaines and leucomaines, and act especially as depressants upon the nervous system." "They possess an offensive odour, and it is generally assumed that air can be breathed without ill effects so long as this odour is not perceptible, and no longer." To these he gives the name of "spiro-toxines." These exhalations are always present, and the production of them is greater the higher the temperature. It is well to emphasise this point, for it means that the vitiated atmosphere of a crowded room practically acts as a slow poison. The removal of these "spiro-toxines" is difficult on account of their small diffusive power, and therefore "to effect good ventilation we must convey good air *en masse* to all persons occupying a room, and must place no reliance upon diffusion. This is the cardinal principle of ventilation for crowded rooms." A stream of air entering a room through some shaft or small aperture may well be likened to a stream of water under pressure coming through a tap, the smaller the opening the faster the flow and the less likelihood there is, therefore, of adequate diffusion.

It is stated that if 3,000 cubic ft. of air per hour, or about 1 cubic ft. a second, is supplied to each person the air remains free from the odour of "spiro-toxines," but when properly distributed, a much smaller quantity suffices. To supply this amount without causing a draught has been the difficulty. A draught may be said to be a current of air passing with some velocity through air of a higher temperature, and, as a general rule in a room, discomfort will be caused if the temperature of the current is below 60 deg., though different persons are differently affected by various conditions of atmosphere.

Dr. Lyon's method is to so diffuse the air, and diminish its velocity before its admission, that draught is avoided, and the means employed to do this are certainly most ingenious. The illustrations show the system as fitted up in Dr. Lyon's own dining-room, and will serve to explain the principle, which is equally applicable on a far larger scale.

The method of diminishing the velocity and producing diffusion is shown by the upright panels in fig. 1, which form the front of a shallow vertical shaft. The panel consists of a series of cross bars arranged in a frame, similar to a louvred shutter, only the louvres are vertical instead of sloping, the space between the bars being varied to suit the size of the panel and the amount of air forced in. Placed longitudinally across these louvres are strips of wood tapered from a broad base to a narrow apex. The air spaces are thus diminished proportionally, the greater space being nearer the point where air is admitted from a trunk or conduit above, at which point its speed is greatest and pressure least. As the air passes down the shaft its speed diminishes, but its pressure increases on account of the tendency to heap up at the closed end of the shaft, and as it impinges upon the cross louvres, which are square in section, it is projected into the room in a horizontal direction; owing to the diminishing of the apertures and the low speed but increased pressure towards the bottom, where the apertures are least, the volume and velocity of the air admitted into the room is practically constant over the whole area of the panel. That this really is the case is easily seen by opening the panel and feeling the strong draught inside the shaft, and then closing the panel and placing the hand or a lighted match at any point a few inches away from it. At the installation in question about 6 in. from the panel it was difficult to detect any current of air.

The air from the trunk is deflected into the vertical shaft by bafflers, on the same principle, by means of which the air coming down the shaft is equally distributed over its cross section and is given a downward vertical direction.

Having explained the means of diffusion, the general system can now be described.

Fig. 2.

Fresh air is drawn in from outside the building by means of a fan, and is first purified and warmed, and then driven along the trunk above the vertical shafts, the number of which would, of course, be regulated by the size of the building to be ventilated. The fan and trunk are so arranged that the least possible pressure is produced, the aim being to, as it were, bowl the air along the trunk. The method of purification is a simple one, devised by Mr. Kenneth Teale. The air passes over a series of trays filled with oil, and arranged in alternate rows. The oil has the property of catching and absorbing the dust and solid impurities in the air passing over it. These fall to the bottom of each tray, and the oil therefore always presents a pure surface to the air. The heating can be effected in various ways—either by steam, hot water, or electric radiators.

The general appearance of a room fitted with ventilators on this system is shown in the perspective sketch, fig. 2. A somewhat similar arrangement of extract openings is necessary. These, however, need not be of equal area to the inlets, but must be well placed and well distributed at opposite positions in the room to the inlets.

The obvious objection that dust will collect in the trunk and shafts is not so great as may be imagined. The air passing through the trunk is of such volume that in practice it is found that it keeps it and the shafts and panels sweet. The collection of dust in these is far less than might be expected.

It must be mentioned that open fires can be used, and windows kept shut or open as desired—a very considerable point in favour of the system.

At the Camera Club demonstration Dr. Lyon fitted up a conduit in a temporary manner along one side of the room, immediately below the ceiling, the conduit being arranged on the same form and principle as the vertical shaft illustrated above, and from which the air therefore was diffused throughout the whole length of the room, vertical shafts being impracticable in this instance. The cross section of the conduit was 2 sq. ft., and air was drawn in by means of a 30-in. electric fan, and was warmed by passing over five electric radiators. On the opposite side of the room three extract fans were fitted up in the upper parts of the windows. These were closed and the room allowed to become foul and full of smoke, some seventy members being present.

The apparatus was then put in motion, and in a short time the room was completely cleared, and for the remainder of the evening a temperature of 64 deg. was maintained, the air being fresh and the room wonderfully free of smoke. The temperature of the incoming air was 62 deg.

No perceptable draught was felt, except to the feet, but the floor temperature was also 64 deg., and this draught was probably caused by the open fire and cold air blowing in at the door. The members of the club who afterwards joined in the discussion all testified to the fact that the purity of the atmosphere was in marked contrast to the usual experience at ordinary meetings. It must not be forgotten that the arrangements made were of an entirely temporary character, and therefore the success was the more striking.

Dr. Lyon illustrated the complete way in which the atmosphere of the entire room was changed by the simple method of impregnating the incoming air by means of a bottle of lavender water, the odour of which quickly penetrated to every part of the room, and then again soon disappeared, showing that every portion of the room was equally diffused with the pure air, which was again equally extracted.

The cost of the system is probably not greater than any other method of mechanical ventilation, by which air is purified and heated; and heating is obviously necessary in large assemblies, if the air is introduced in sufficient volume to be effective. The panels would lend themselves to sensible architectural treatment, and many cheap and simple expedients could be adopted to carry out the main trunk or conduit.

The supply of electricity for purposes other than lighting is now so cheap in most large towns that the question of fans and motors ought not to be a serious one; but nothing can be so costly or serious as the deleterious effects of breathing poisoned air, though how dangerous such effects are few people yet realise.

It can hardly be too strongly insisted on that the ventilation of almost every public place of assembly is at present very deficient; it is universally recognised that some means of mechanical ventilation is imperative in such buildings, and yet ventilation is a subject much neglected by architects as a rule. Pure air is absolutely vital to the well-being and health of the community, and the "open air movement" in relation to the cure of tuberculosis clearly demonstrates that the remedy for the disease is also the means of preventing its being contracted in the first instance. The seeds of our national disease, consumption, are certainly often first sown in the foul and contagious atmosphere of some ill-ventilated place of public assembly, and any method which appears to possess intrinsic advantages is worthy of careful consideration and trial.

NOTES.

Asylum Accommodation.

THE Report of the Asylums Committee of the London County Council on the Colney Hatch fire, as published in the daily Press, appears to us an extremely deficient one, and entirely to beg the question raised by the verdict of the coroner's jury. The coroner's jury found that the plan and construction of the building, as well as the materials used in its construction, were unsuited even for temporary buildings, and condemned it as unsafe. Yet there is no finding in the Report on this question, the Committee apparently confining themselves to minor matters, such as water supply and internal management in the conduct of the establishment, and a statement of the so-called difficulties the Council has had to contend with. Those difficulties do not, however, appear to us as very stupendous. When the County asylums, by virtue of the Local Government Act, 1888, were transferred to the London County Council in 1890, it appears that accommodation had to be provided for 10,104 lunatics. This number has now increased to 16,961, by an average annual increase of 517. But the provision of permanent accommodation for the above number of lunatics would not seem an impossible task for a body with such energy as the London County Council to have accomplished in thirteen years. From this Report it would appear that a sum of nearly 2,000,000*l.* has been expended on asylum accommodation, and that temporary buildings are in use at three of the asylums at least. Further information on this subject will be read by the public with interest, for with a Council so desirous of extending its sphere of operations, the reflection will occur to many that with a little more energy expended on this matter, specially entrusted to them by Act of Parliament fourteen years ago, the housing of some 17,000 lunatics in permanent buildings might easily have been accomplished ere this.

Railway Management.

THE climax of the railway shareholders' "revolt" may be said to have been reached on Thursday last week, at the half-yearly meeting

of the London and North-Western Company. The Reform Committee were backed by 3,000 shareholders—a conclusive proof that the movement had assumed far greater proportions than that of an ordinary agitation. "We are all reformers" was the burden of the speeches on both sides, the practicability or otherwise of the suggested remedies being in dispute. Everyone seemed agreed as to the necessity for combination—the advantages of which we indicated some time since—though the *Times*, in a recent article, warns the public that, in this respect, the shareholders' gain may prove their loss. There was much more difference of opinion as to statistics, and it may be remarked that it is not only in this country that more statistics are being called for. The Inter-State Commerce Commission is pressing for more details of American railway working, and the railway companies are offering a vigorous opposition to the proposals, as being of no practical value, while involving great expense. Precisely the same arguments are being used with regard to our own railways. The large waggon question has been thoroughly discussed already, but as illustrating the difficulty of instituting reliable comparisons between English and American methods, the following statistics, from a paper given before the Western Railway Club, may be quoted. In 1891 the average net tonnage per car of western roads was about 12 tons, and in 1902, 16 tons. The writer was confident that the net tons per car could be increased to an average of from 20 to 25 net tons per car. We never need fear any comparisons as to safety and speed, which may reconcile the public to many shortcomings; and Sir Alexander Henderson recently pointed out another feature in connexion with American railways which should tend to reconcile shareholders, viz., the large proportion of undertakings which get into the receivers' hands. Truly, we are not so badly off in the old country as we might be.

Royal Academy Lectures.

CONTINUING his lectures on metallic architecture at the Royal Academy last Thursday week, Professor Aitchison cited instances of the use of metal in building, and dwelt on the probability of its still further use and development. We do not think the Professor's illustrations of its constructive value likely to increase the advocates of its open use in architecture, though we agree that if used at all it should be an evident factor in the treatment of the design. Concealed ironwork is so commonly employed to deceive the eye of the uninitiated that sinning in this respect is particularly easy, but one can remember the sense of disappointment on first learning that Brunelleschi's great dome at Florence was dependent on a massive iron chain embracing its base. That feeling we believe to be healthy, and it illustrates a certain difference of sentiment inspired by the Renaissance builders on the one hand, and the Greek and Gothic builders on the other. The improper use of iron is certainly not the least of the errors of present-day city architecture. The professor did not sufficiently emphasise the fact that the right use of metal by the ancients was in decorative work, such as that used by the Peruvians in the Temple of the Sun, by King Solomon in the first Temple, and the like use of precious metals where they were to be obtained in quantities. This is the natural use to put them to; it cannot, however, entitle the buildings so adorned to be described as metallic architecture, any more than glass mosaic can be called glass architecture. The problem is still to be solved; in no sense can concealed iron work be called architecture. In his instances the professor did not allude to the iron spire of Rouen Cathedral or to the British Pavilion at the recent Paris Exhibition, both interesting as illustrations of what ought not to be done. Neither did he allude to the little front in George-street, Westminster, by Mr. Halsey Ricardo, which in our opinion is the best piece of exposed ironwork construction that has been done. On Tuesday the lecturer spoke upon colour in architecture in an interesting way. He reminded his hearers that the Romans were the first people to leave their architecture uncoloured. He said that Greek sculpture was mostly coloured, and the brother of Phidias was by calling a sculpture colourist. Speaking of the lessons to be learnt from the past, he pointed out the crudeness of the few strong primary colours that were used externally compared with the softer and more subdued tints employed within. That colour is not more largely used nowadays is a matter of regret; but, as the Professor said, it takes very rich people to use it effectively, and rich people fear the caprice of fashion in taste for styles of decoration, as well as for the neighbourhood in which to live. The East is, after all, the home of colour; as a superficial decoration it will always, we fear, remain an exotic in this comparatively sunless, smoke-stained country. In Persia, where you pay extra if your house is coloured with an original design instead of with one from the pattern book, colour in architecture must be a very practical subject to discuss.

Municipal Debt.

THE return of the municipal indebtedness of London for the year 1901-1902 has just been made to the London County Council, and an increased charge on the rates is shown of 161,891*l.*, although this sum is reduced by 62,262*l.*, which represents a return made for income tax paid in the past seven years. The rate in the pound, leaving this sum out of account, would be 19·40d., as compared with 19·54d. in 1901-1902, the rateable value having increased, but the total debt outstanding has increased from 49,910,029*l.* to 54,257,005*l.*, and the percentage of debt outstanding to rateable value has increased from 133·12 to 136·43. The so-called "remunerative debt" shows an increase of 26 per cent. In another Report of the Finance Committee it appears that the money obtained by the Act of 1902 is insufficient, and that further powers must be sought to raise an additional sum of 116,000*l.* The greater part of this sum seems to be required for street improvement and housing schemes.

Chatham Railway Rolling Stock.

REFORM in railway matters is on foot, and there are signs that it is even spreading to the Southern lines. We would therefore urge those who are interested in the progress of this movement to lose no time in visiting the Chatham branch of the South-Eastern Railway, where the old-fashioned carriages our forefathers contentedly travelled in can still be seen, and a comparison can be made with the modern railway coach. The first-class carriages compare unfavourably with the third-class carriages now in general use, and although the antiquary may regret the Philistinism of the directors which has defaced a few of these relics of bygone days by fitting them with electric light, it only requires a small effort of the imagination for the traveller still to picture himself back once again in the early sixties. Possibly it is owing to the fact that much of the Continental traffic passes over this line that many of our foreign neighbours imagine themselves to be far ahead of us in the matter of railway management.

Hampstead Heath Protection Society.

THE sixth annual Report of the Hampstead Heath Protection Society refers to their opposition to the Tube Railway scheme, and notes that, though the preamble of the Bill has been declared to be proved, the clauses for the protection of the surface of the Heath have been strengthened, and it is understood that no generating station will be erected at Golder's Green. In regard to a point already commented on in our columns viz.: the recommendation that the London County Council should purchase some of the Eton College fields, to prevent building close to the Heath after the making of the railway-station, though nothing decisive can be reported as yet, it is stated that the suggestion has the approval and support of the Commons and Footpaths Preservation Society, the National Trust for Places of Historic Interest, the Metropolitan Public Gardens Association, and the Society for Checking the Abuses of Public Advertising. The Committee are pleased to announce that the London County Council have acceded to their request that the grazing of sheep should not be allowed on the upper part of the East Heath, which is already too bare of natural growths. The Committee have opposed the application to the County Council to make a horse-ride on the Heath, and with success, as the consent has not been granted.

Dudley Gallery Art Society.

THE thirty-ninth exhibition of the Dudley Gallery Art Society (watercolours) is more interesting for some of the smaller works than for the larger and more prominent ones. Miss Gilchrist's large drawing "The Heart of the Forest" (137), at the top of the room, is indeed a careful and highly finished work, but rather tame in style. The lady artists are, however, among some of the best contributors in this Exhibition. Among their works may be mentioned Miss Sylvia Drew's "A Sussex Village" (3) and "Drinking Pool on the Downs" (14), the latter a powerful sketch, for it is a sketch rather than a finished drawing; Miss Rose Hake's "Old Christ's Hospital" (61); Miss Margaret Bernard's "Corfe Castle on a Wet Day" (101)—it should surely have been "Corfe" for it shows the village street, not the castle; Miss Jex-Blake's Evening on the River" (121); Mrs. Heathcote's "New Forest" (127) by moonrise; and Miss Mildmay's "Marsh Meadows" (186), with a very fine sky. Miss Gertrude Martineau's "Cairngorm Mountains in October" (10) seems to us rather to fail in conveying the scale of the scene, her other mountain picture, "A Lonely Glen near

Aivemore" (31) is a fine work. Mr. George Marks's "A Surrey Cottage" (30) is a beautiful little drawing, none the worse for reminding one a little of Mrs. Allingham; Mr. Lexden Pocock's "The Peacock" (43), in which the bird gives the name to a garden scene with a clipped hedge, is an interesting little picture; and all Mr. Sylvester Stannard's small drawings of landscape are worth attention. Mr. Block comes before us again with one of his still-life studies of old books (100), admirable in its way; and we may mention also Mr. Powell's "Poppies" (111), Mr. Witherby's "A Road in the New Forest" (113); Miss Millicent Gore's "Mortlake on Thames" (125); Mr. Adams's "A Woodland Road" (183); Mr. Percy Dixon's "West Coast Bothies" (184); Miss Mildmay's "Corfe" (201); Mr. George Marks's "Rhododendrons" (204) and "Sunny Morning" (209); Mr. F. Dixey's "Shiplake Weir" (214), Mr. Coleridge's "Argegno, Lake of Como" (215); Mr. David Green's excellent sketch of boats "Going to Sea" (217); Mr. George Marks's "Rapallo" (227), a different style of subject from what is usual with him, and in which the buildings are admirably treated; Mr. C. Duassut's "Going Home" and "A Woodland Path" (232, 233), and Mrs. Jardine's "An Engadine Night" (246), a snow effect. Architecture is not very successfully treated in the drawings specially dealing with that class of subject; Mr. Cafe's two large Westminster Abbey interiors (94 and 248) are well drawn, but deficient in showing the texture of stonework; and Miss Brace's "Chantry of Cardinal Beaufort, Winchester" (7), which is broader in style, fails in not showing the architectural detail with sufficient precision—at least from an architect's point of view.

The Ridley Art Club.

WE do not remember to have heard before of the Ridley Art Club, which is holding its seventeenth exhibition at the Grafton Galleries. We should gather that it is essentially an amateur society, though the names of a few known artists appear in the catalogue—Mr. Melton Fisher, Mr. Padget, Mr. Ayerst Ingram, &c. The collection is a large one, not all of it very interesting but containing some good things; Mr. Lenfesty's "Solitude" (40), a wild moorland scene; Mr. Padget's "Wild Weather" (55) and "A Marsh Dyke" (58); Mr. Haité's sketch of "A Venetian Fruit Stall" (60); and Mr. Melton Fisher's portrait of "Mrs. Melton Fisher" (80), the face seen through a veil. Among the works by names not familiar to us we were most struck with two bas-relief sketches by Miss Ruby Levick, "Sledge-hammerers" (140) a vigorous subject from actual life, and "Sketch for Memorial Tablet" (197), which is interesting in sentiment as well as decorative in design.

THE EDINBURGH BUILDING TRADES EXCHANGE, LIMITED.—A meeting of the members of the Building Trades Exchange, Limited, was held on the 19th inst. in the rooms at 26, George-street, Edinburgh, Sir Thomas D. Gibson Carmichael, Bart., presiding. A lecture was delivered by Mr. Henry F. Kerr, his subject being "A Glimpse of some of the Great Mediæval Churches of Britain." In the course of his lecture, which was illustrated by limelight views, Mr. Kerr referred to the current of architecture from Egypt to Rome. For the greater part the lecturer dealt with the plan of our great mediæval churches founded upon the Roman basilica, and afterwards he described in some detail the various churches of Great Britain, such as Durham, Salisbury, Peterborough, Elgin, Canterbury, York, and Melrose.

HOW TO ESTIMATE.

THERE are few subjects wherein less reliance can be placed upon what may be termed "book knowledge" than builders' estimating. So many elements combine to render it one that must always be considered anything but a definite science. Therefore, experience must take the place of the formulæ that form the basis of most calculations in other departments of business life.

The multiplicity of items, the constantly changing prices of materials and, one can almost add, of labour also, and the varying conditions under which the work has to be executed, all have to be taken into consideration as well as the important item of carriage and cartage. In these latter items, the distance from a railway station and the state of the roads must tend to vary the price. Again, the price of labour in the locality in which the work is being executed and the question as to whether the supply will equal the demand, as, if this is not the case there will be a still greater difference between the price of local and imported labour, as in the latter case railway fares and "lodging money" will have to be reckoned with.

Consideration of the points just mentioned—and these constitute a few only of a very large number—will show that any author who takes up the subject with a view to giving general instruction, may well be appalled by the magnitude of the task he has set himself. Praise, then, is all the more due to Mr. Rea for the painstaking way he has dealt with the items contained in his book* which, notwithstanding sundry imperfections, is certainly one of the most complete works of its kind that has appeared for some years. The author appears, however, to place rather an undue reliance upon "constants of labour," which, however, most men engaged in pricing, or at any rate who have an opportunity of judging, will say are anything but constant. In fact, the author himself, on page 72, gives a good example of the fallacy of relying upon constants, where he states in effect that the number of bricks laid by a bricklayer, supplied with materials by his labourer, vary from 1,500 down to an average—given him by "a large builder"—of 400. On the next page, in calculating the price of brickwork, he bases his price upon the supposition of the bricklayer laying nearly 1,000 per day; thus arriving at a price which is obviously too low with bricks at 35s. per thousand, as he would find upon looking at any reputable builder's competitive priced bill. He would find that the 3*l.* per rod for labour would have to be increased by something like 50 per cent. He starts with the erroneous assumption that the price of labour generally is 10d. per hour, and labourer 6d.; whereas the standard price of the former is 10½d., and the latter 7d. This, however, does not materially affect the price of brickwork before mentioned, as he reckons the day as ten hours instead of nine. Few builders would be content to accept 15s. per rod as a sufficient price for the extra cost of cement over lime mortar—twice this would be nearer the mark. On page 77 he takes this low price as a basis for half-brick trimmer arch in cement (with no allowance for extra labour in building an arch, in half-brick thickness and in small quantities), which works out at 4¼d. per foot; little more than half the real value. We do not understand why the author also includes the rough cutting (evidently for the skewback) in the item. The price for levelling up with concrete is also a low one, as it is in small quantities, apart from the fact that it is based upon a somewhat low quotation for concrete (10s. 5d., page 55) in the first instance.

In arriving at the price per foot super for facing, Mr. Rea is again led into an inconsistency, for, although in the second item on page 75 he notes that there is "extra for a better joint," *i.e.*, than the struck joint of the first item, he prices both at the same rate: 16s. 8d. for 272 ft. of struck joint and ¾d. per foot for "*raking out* and pointing." In the latter case the joint is not only "better," but the price includes raking out also. Then, again, on page 81 we come to another item of "pointing new work, flat struck joint in lime mortar, including raking out the joints," which is priced at a fraction over 1s. 7d. per yard, while the same item in *fine* mortar (second item on page 75) works out to something under 10d., *i.e.*, 9d. + 10 per cent. We have no account taken of the note to the end of the item on page 75, just mentioned, representing a value of 2d. per foot for "pointing and rubbing facing bricks," and therefore do not know whether this or at least a portion, *i.e.*, the "rubbing," should be added to the price or not. While acknowledging a certain difference in the value of pointing to outside and inside work, that difference, in our experience, is not in the proportion of 15 to 40 as given in the first and third items on page 75.

In the item of air-bricks on page 86 the author, after taking the trouble to measure the rendering inside, arriving at an area of 1 ft. 6 in., prices it at 1d, *i.e.*, 9d. per yard We are afraid he would find few builders who would be willing to accept this price for rendering in a 9 in. by 3 in. hole.

We have dealt rather severely possibly with the chapter on bricklayer's work, but it is only by such comparisons as we have given that the fallacy of the constants and the pedantic dissection of items when carried to the extreme, as Mr. Rea is inclined to do, can be clearly shown; and painstaking as the work shows his labours to have been, these comparisons and results will make it clear how easy it would be for any one relying upon this method of pricing to be led astray with disastrous results. In the examples given we think it probable that the builder employing them would generally find himself decidedly at the bottom of the list of tenders, but how long this would remain the case would depend upon the amount of capital at his disposal. The same objection applies, more or less, to the whole of the examples given. We do not think, for example, that many estimators would work out the price of screws for fixing a 6-in. barrel bolt or a sash-fastener on the lines given on page 216—"Six brass screws ½ in. No. 8 gauge at 2s. 3d. per gross, less discount=⅛d." The author himself evidently feels the weakness of this system, *e.g.*, on pages 255 and 256 we get items of "labour and profits," "labour and solder and wall hooks," "labour fixing including solder, &c.," which in some of these examples is the larger portion of the price, also in the prices for ironwork—even small items, such as gratings, hinges, and such like, the price of fixing is added at per lb. or per cwt. which, to say the least, is a somewhat rough and ready method, especially in the midst of such detailed pricing as we have quoted.

As we presume this is not to be an annual volume, we doubt the advisability of giving the prices in the form of a price-book, apart from the fact that it is rather in contradiction to the general instructions given for making-up prices.

Notwithstanding the various weaknesses we have pointed out, the book must be considered an interesting attempt to put builders' pricing upon a definite basis, and we have therefore dealt with it in a detailed and analytical manner, such as the importance of the subject demands. This consideration only tends to emphasise our opinion that builders' pricing is—and probably always will be—a subject that demands practical experience before anything. In fact, without this experience it would be useless to attempt it with any degree of success. Given this, the perusal of a work such as this will be of assistance in formulating some ideas to enable us to place the experience before mentioned upon a more business-like footing. Far be it from our intention to suggest that rule-of-thumb should take the place of anything more definite, but it requires a good deal more than an academic dissection of items to arrive at the cost of the various works, taking into account the many elements of variation mentioned in the earlier part of this article.

To revert to the book. Some of the points open to criticism appear to arise from the author's association with Irish building work, which possibly accounts for the errors with regard to labour before mentioned. There are various little slips that should be corrected, *e.g.*, rolled steel joists are given at 6*l.* 15s. per ton, while lower on the same page the price is quoted as the same as "B. B. Staffordshire bar iron," *i.e.*, 8*l.* per ton. There is also a note under the price of lead to say that "the price is lower than when the book was written." A note such as this should be avoided, as it is only a matter of correction. We should strongly advise the author to revise the work thoroughly and to deal with the items on *consistently* broader lines.

C

* "How to Estimate." Being the Analysis of Builders' Prices. By John T. Rea, M.R.I.A. (Ire'an'). F.S.I., &c. London: B. T. Batsford. 1902.

Notwithstanding our criticisms, we can heartily commend the work as a painstaking attempt to deal with a very difficult and—we may almost add, owing to its unstable nature—a very unsatisfactory subject.

THE ARCHITECTURAL ASSOCIATION.

AN ordinary fortnightly meeting of the Architectural Association was held on Friday evening last week in the Meeting-room of the Royal Institute of British Architects, No. 9, Conduit-street, Regent-street, W., Mr. H. T. Hare, President, in the chair.

The following gentlemen were elected members of the Association, *i.e.*, Messrs. W. Hart Gregson, G. P. Bankhart, C. L. Wright, and C. F. Cargill.

Mr. H. P. G. Maule, Hon. Secretary, proposed a vote of thanks to Mr. Aston Webb, A.R.A, for kindly conducting a party of members over the Victoria and Albert Museum and Royal College of Science on the 7th inst.*

This having been agreed to,

The Chairman announced the following additional donations to the New Premises Fund, *i.e.*, Mr. Andrew Oliver, 2*l.* 2*s.* 6*d.* and Mr. R. H. Weymouth (second donation) 2*l.* 2*s.*

The Chairman proposed a vote of condolence to the relatives of the late Mr. F. C. Penrose, which was agreed to in silence.

Stained Glass of the Future.

Mr. Silvester Sparrow then read the following paper:—

This title has been adopted in imitation of Richard Wagner's "Art-work of the Future." That, which was scoffed at as an idle dream, and parodied as "The Music of the Future," has become a present actuality. May the omen be propitious!

There is scarcely any subject about which more ignorance prevails than in Stained-glass. Quite a number of people still think that the glass-stainer paints the colours on the window. I am not sure whether the idea still survives that a window is leaded up before it is put in the kiln. Even among architects how few there are who can tell one material from another, the good from the bad, or who know which is the best for a particular purpose. One of my objects, therefore, is to place you in a position to judge for yourselves whether the best material has been given to you, and if the best use has been made of it, not only with the view of enhancing the beauty of your own works, but also to protect your clients, who doubtless rely upon you to see that they are not palmed off with shoddy or base metal. I will preface the few thoughts which it is my privilege to offer you with the sweeping assertion that no one has any right to speak about Stained-glass who has not worked in the best material. When I have reached the end, you will probably grasp the point of view from which I make this assertion. For the present, suffice it to say that the critic can only deal with what he knows; therefore, in judging a window he can only compare it with other windows, either ancient or modern. He can never say, like the worker in the best material, that this subject should have been treated in such a manner to produce such and such a tone, or that this or that part would have been better if such and such a material had been employed. In a word, he can never look into the future, and say what ought to be. The very title of this address would seem to disclose a certain dissatisfaction with Stained-glass as it is. It will, therefore, be our first task to find the cause of our dissatisfaction; to diagnose the disease, in fact, before we talk of remedies. Imitation is the disease! And why is imitation the disease? Because it has been said, and repeated on all sides, "There is no glass like the old glass, and there will never be any windows like the old windows." Both these assertions I deny, since they are based on ignorance of the best material procurable to-day, and of the use that might be made of it. Take, first of all, the effect of those assertions on the producer of stained-glass. He has been content to imitate a cheap period, viz., Perpendicular or fifteenth century work, and imitations of that imitation. When I say a cheap period, I mean as regards the material. It is well known that from the thirteenth to the fifteenth and sixteenth centuries the material deteriorated, becoming thinner and poorer in quality and colour. Whether this decline, which was concurrent with a natural development in the technique of painting, was due to a demand of the painters for a material that would better display their painting, cannot now be known. I am inclined to think it was, but it is not a fact of much importance. If so, it simply proves that they had lost the idea of the essential qualities of a stained-glass window; that it must look like glass and give tone. They had chosen the wrong material for the display of their painting powers. I must protest against glass being used as a material for excessive painting. If you *must* paint, paint on wood, on canvas, or wall; but leave to glass its essential qualities of brilliance and translucency. If therefore, one would make a passable imitation of that period, one would have to ignore the best and most expensive glass made now, and use the cheapest and worst. Why that period should have been chosen for imitation rather than another I cannot imagine, unless it be on account of its comparatively cheap production—where so much of a window is given up to canopy and base in whites, which do not require, or at least do not receive, much thought; where the whites of the drapery and of the flesh run into the canopy and base (being usually cut out of the same tint), and the little bit of rich colour in the drapery, rich only by contrast with the white, stands absolutely alone, a shapeless mass. We will give these people the benefit of the doubt, and admit that this period is said to be that in which the highest point in the technique of painting on glass was reached. It is fortunate for them that it is also the period of the poorest glass, if we except the frightful colours of a generation or two ago. One shudders to think what their fate would have been if the style of their choice had been the most expensive to reproduce. Would there have been as many imitators? Another plea that will doubtless be put forward by the Imitators is that if you have to put windows in a thirteenth or fifteenth century church you must imitate the glass of those periods. But the very existence of different styles, almost coincident with the centuries, so that we speak of a thirteenth, a fourteenth, or a fifteenth century style, proves that the old men did not imitate their predecessors. There is another theory, that the old men adapted their glass to the varying styles of architecture. It may be that architects of the fifteenth and sixteenth centuries called for a lighter glass, which would show up the more elaborate carvings they indulged in. Those who hold this theory may say that the glass-stainer of to-day should adapt his glass to the architectural style of the nineteenth century. But is there a nineteenth century style? Perhaps I am treading on delicate ground, and had better leave you architects to settle the question amongst yourselves. The Imitators, however, by no means rigidly follow their own rule; for instance, the imitators of Perpendicular can rarely do anything else, but put it, with little or no variation, into every style of church. Let us leave the question of *why* the early glass-stainers did this or that, and assume that if they were alive to-day they would have sufficient honesty to use the best material, and sufficient talent to make the best use of it. What, then, is to be our own course with regard to this crucial point? This is the fundamental and unalterable guide for our conduct:—*One has no right to put bad glass into a window under any pretext whatever.* I have already pointed out that, to imitate, one would have to ignore the best glass. The highest qualities of a stained-glass window are mystery and rich and appropriate colour in harmony with the subject. Do not tell me, therefore, that an imitation fifteenth-century window is appropriate when it lacks mystery and richness of colour. If a window is full of mystery and devotional feeling, a living symbolism, rich and harmonious colour, a simple and dignified design, strengthened by a bold use of the lead, and an expressive tracing and painting, it is worthy to be placed in any church that was ever built. Before describing the process of making a stained-glass window, by which you will be enabled to know what to look for in a window, and thus to protect yourselves at all points, I must attempt to give you some idea of what I have called the best material. The best material is undoubtedly Prior's Early English glass and Powell's Antique. Early English is a comparatively recent invention, having been in existence only some few years. One would gather from its name that it is an attempt to restore the old English glass; but, in my opinion, in the quality of brilliance, in its variety and richness of colour, this far surpasses its original, and I have no hesitation in saying that this is the finest glass that has ever been made for our purpose. There are three sorts of coloured glass used in the stained-glass window. Tints, which go under the generic term of "Whites"; Pot-metals, in which the colour goes right through the sheet; and the flashed glasses—that is, the rubies, some blue, and other varieties. The method of manufacture is somewhat like this:—A piece of metal, as the molten glass is called, is taken on the end of a blowpipe, and blown into a square bottle shape. This contact with the mould gives the glass a certain roughness and inequality, while the inside of the bottle retains a very smooth blown surface. It is this combination which is the characteristic of this kind of glass—brilliance united with body, a faculty of holding the light, while "Antique" is more or less transparent. It also varies considerably in thickness, some pieces being quite half an inch thick or more. All this helps its rich and jewel-like quality. The bottles are then cut at the edges of the sides and bottom; which gives us four sides or slabs 6 in. by 4 in. and one bottom 4 in. by 4 in. This is the most general size. Other sizes are 7 in. by 5 in. and 8 in. by 6 in. the largest. It has been found that this size cannot be exceeded without losing the jewel-like quality of the glass. In flukes or accidents, which are the best things in the manufacture of material for stained-glass, it is particularly rich. When the heavier chemicals sink to the bottom of the pot, the last few bottles that are made from it are streaked and varied in colour in a most wonderful and beautiful way. The colour of these bottles may be quite different from those made from the top of the pot. This quality of unexpectedness is most valuable, and a window largely carried out in this material is unique, absolutely inimitable. It must be said, however, that the scale of colour is not exhaustive, and that some of the colours are very crude (although these have their uses occasionally), so that one has to fall back upon Powell's "Antique," by far the best of the so-called "Antique" glass. Although Powell's "Antique" is not so fine as "Early English," it has qualities of its own to which, in the present state of the manufacture of "Early English," it may be regarded as complementary; thus I include it in the term "best material." Although it has not the brilliance and body of "Early English" it has those qualities in a much higher degree than other makes of "Antique," which I need not specify. I should mention that there is an imitation of "Early English" called "Norman," which bears a relation to its original similar to that which the common "Antiques" bear to Powell's, and is cheaper. Let me therefore warn you, when you specify Prior's "Early English," to see that "Norman" is not substituted. When I mention that you can get "Norman" for 3½*d.* per slab, and the lowest price of "Early English" is 6*d.* per slab, the reason for the substitution is obvious. Broadly speaking, "Early English" has more light, Powell's "Antique" more tone; so that one would use "Early English" for effects of light and brilliant objects, and Powell's "Antique" for the parts requiring tone. It is also good to plate a crude piece of "Early English" with, to gain variety of colour and tone. The process of manufacture in Powell's Antique is quite different from the other. It is made in what is called a "Muff"—that is, the metal is blown into a cylindrical form (but not into a mould) about 7 in. in diameter and about 13 in. or 14 in. high. It is then cut down the height, and placed in a flattening kiln, to come out a flat sheet about 21 in. to 23 in. long. It is in the process of flattening that the glass loses some of its brilliance. In this manufacture there are also gold pink on Venetian opal, blue on Venetian opal, and gold pink and blue on Venetian opal. The Venetian effect is a ripple or indentation in the glass, which gives it greater brilliance than the flat Antique possesses. The opal is the base, and when a thin skim of blue is flashed upon it it produces a varied cool green tint, with streaks of blue. The gold-pink is a thin skim of gold flashed on the opal base, the warm tone of the opal softening the sharpness of the pink; the colour produced by the gold. The streaks of blue and gold-pink on

* See our issue of the 14th inst. for an account of the visit.

the opal produce beautiful combinations, often with markings of a feather-like character. This is very good to work away from the gold-pink with. All these are very valuable for special effects. Powell's also make their glass into circles of about 12 in. to 14 in. diameter. These are much richer than the flat sheets, of which they seem to be a concentrated form. Before leaving the subject of the quality of the material, it will be well to devote a little attention to one colour, the most important in a stained-glass window, viz., ruby. Indeed, it may be called the touchstone of a window, so far as the quality of the material is concerned. There are two metals which produce the red colours we call the Rubies: gold and copper. Ruby is one of the flashed glasses: that is, a base of white, amber, green tint, pale blue, or purple is flashed over with a thin skim of either of those metals. Gold ruby is confined almost entirely to "Early English," in which it reaches a price calculated to freeze your young blood, and make each particular hair stand on end. You will easily understand that there must be a considerable difference in the cost of these two kinds of ruby; nor will you have much difficulty in guessing which kind is so fondly embraced by the commercial and imitation people. It will be difficult to give you much idea of the enormous difference between the two. Gold ruby is the most distinguished colour, an aristocrat among colours, whereas Copper ruby is common and vulgar. Gold ruby is one of the triumphs of Prior's "Early English" glass, in which it provides an infinite variety of Rubies, from the richest wine colour to the most delicate and ethereal tints. This variety is partly due to the varying thickness of the gold flash, and partly to the different kinds of base, which also varies in thickness. Spoilt ruby is also another fruitful source of variety, that is, overfired, or when the metal in the pot, decreasing in quantity, becomes too hot. Spoilt in the sense that the maker has missed his aim, but invaluable to those who seek after unique effects. Not that Copper ruby is to be entirely ignored. The darkest tones of Copper ruby on blue may be used as a subsidiary red, but it can never take the place of Gold ruby as the chief mass of red. Powell's brown ruby; a little gold (generally too little gold) mixed with the brown flash, leads to very varied reds, generally of a sombre sort, which may be used in a similar subsidiary sense. Having shown you *which* are the best materials, I must say that architects are extremely lax in the matter of seeing that they get them in stained glass. If it were a matter of drain-pipes, they would study all the different kinds and specify those of a particular maker; they have a dim sort of idea that if they did not do that, some cheap and inferior quality would be foisted on them. Ah! you will say, but stained-glass is a sacred art; its makers could not do such things: why, therefore, take such precautions? If such be your touching faith, there is nothing more to be said; yet would it not be worth while to inquire where all the rubbishy glass goes to, and why there is so little good glass made, that one is absolutely forced to plate (a technical term which means to lead two or three layers of glass together) a great deal more than one would? I do not see why architects should not specify Prior's "Early English" glass and Powell's "Antique." Let us admit it as conceivable, that what I call the worst glass these people may consider the best; only permit me to remark that, if so, what they consider the best is invariably cheaper, much cheaper than that which I consider the best. If it is good to see that you get the best material, if it is better to see that proper use is made of it, it is best not to go to any designer whose highest effort has been a public-house window. When I speak of the improper use of "Early English," I think of that church built by a prominent architect who has abjured figure work in stained-glass, and who resolved to have the best glass in plain glazing. One can hardly blame the man for refusing to have a lot of rubbish shot into his church; although, to ignore it, is not to develop the art. It must be grappled with—taken in hand. If you cannot afford good stained-glass, I would always recommend ornamental glazing, however simple, in the best glass, rather than cheap stained-glass. Unfortunately, however, these windows have been done in almost pure white, consequently there is an utter absence of tone. To enter the church is like going into an ice-house. Even in ornamental glazing, tone and variety are essential. Let me here make another assertion. Some of you may be under the impression that we put windows in to give light. That is not so with stained-glass: a stained-glass window should be put in to give tone. You may deny this, but I say that however much you may strive, you will never get mystery or poetry into your buildings otherwise. The Catholic Cathedral at Westminster is a glaring instance. The architect's ideal of stained-glass was a gin bottle. He has tried to get as near to that as possible with roundels and Norman glass, that cheap imitation of Early English. The windows have no relation to the building, nor have they any tone. Plaster the walls as thickly as you please with gold, mosaic, and marbles, there will never be any mystery or poetry about the place. Before beginning a description of the *making* of a stained-glass window, I am reminded of a lecture by a distinguished man in the Pottery line, which I was once taken to hear. The lecture was supposed to deal with certain difficulties in the firing of pottery: difficulties which confronted the Greeks of Homer's time, who immortalised them in a song. Well, we heard all about that, but as to the Lecturer's methods of overcoming those difficulties, not a word. And there the poor pottery men sat, with open mouths, waiting for the crumbs which did *not* fall from the rich man's table. If speech is the art of concealing thought, then was this lecture a masterpiece. I do not intend to follow this artful craftsman's example, but to describe everything with the utmost frankness; and if I should inadvertently leave anything obscure, I shall be only too pleased to supplement these remarks at the close of my address The first thing, then, is the design, the coloured germ of the future window. This should be made to scale. I recommend 1½ in. to the foot. This is convenient for making the cartoon, one-eighth being equal to one inch, and one can put in a fair amount of detail and suggest variety of colour. The artist is first to conceive the light and tone that will be in harmony with his subject. By "tone" in this connexion I mean that which is a partial deprivation of a particular light, and must not be confounded with light and shade. To give the most familiar instance, moonlight and tone. We see objects that the moon does not shine on cooler in tone than they are in daylight, because the light of the moon is cold. In the same way, whatever light the subject demands (and it is not necessarily confined to sunlight or moonlight, it can be that "Light, which never was on sea or land"); the tone must correspond. Every colour in the window, therefore, must be influenced by either the light or the tone. Colour, which is our next consideration, has hitherto been said to be the chief thing in stained-glass. But that is not so: there is a higher aim: mystery, the result of effects of light and tone: the absolutely indispensable quality in a stained-glass window. In a window we are dealing directly with light; there is therefore no need to conventionalise it, and as there can be no colour without light, we will call light the soul, animating the body, colour. The quality of your window is therefore determined by the amount of light in it. It is in this quality of dealing with light, that the genius of stained-glass lies. It is this which differentiates it from every other medium. The colour must have a definite keynote, also in harmony with the subject. There must be a controlling sense of key, so that one may say, this is a red window, that a blue one. Let me illustrate this in the simplest way. Suppose one had to do the four elements. The Fire subject would demand a red window, Earth a brown window, Air a blue window, and Water a green window. This does not mean that the red window would be nothing but red, but that the keynote and the predominating mass would be red, and the colours of the other subjects would be worked in to enhance its effect, and to form a connecting link with them. Hitherto, windows have been a hopeless jumble of colours, every one for itself, and the Devil take the window. People seem to have started colouring a design at one end, without having had the least idea what the other end would be like. Not that there is any restriction on colours so long as they are subordinated to the key colour. Indeed, let us have as much variety as possible, so long as the unity and harmony of the whole are not impaired. This variety will lead you into the most subtle effects, which will always add charm to a work, and charm is a very essential quality. Strength and subtlety should be the character of the colour scheme, strength, of course, being derived from a bold treatment of the primaries. The primaries must be as rich and full as possible, and in bold masses, if your window is to have the necessary vigour and grip. So-called æsthetic colouring is unpardonable weakness in a stained-glass window. With regard to the treatment of a light window, that end is not to be attained by filling the window with light colours of the same value. That simply results in a washy window, which looks as if all the colour had been bleached out of it. No, use as much "tint" as you like, but there must be some rich colour to show that it is intentionally a light window. The same remark applies to an ornamental window in tints. There should be a little rich colour to give it grip, and a little pure white, by which we may define the strength of the tint. Naturalistic colouring is not essential. Indeed, the most beautiful and glassy effects result from the unexpected. But it must have the appearance of inevitability; one must feel that to replace it with anything else would result in weakness,—"and her hair shall be of what colour it please the glass-stainer." The traditional and symbolical colour of the draperies of Our Lord, the Virgin, the Apostles and others, together with their types, must be preserved (the colour scheme must be adapted to them and not the reverse); so that one may see at a glance who is being represented, or, should I say, one ought to be able to see. The Church window is primarily to appeal to the eye of faith, and one must not assume that the eye of faith is practically non-existent, even though one have to explain to many a learned pastor (that is, shepherd), what would have been perfectly clear to the flock (that is, the sheep) of the Middle, or so-called, Dark Ages. This leads me to say that the Symbolical is to be preferred to a literal treatment. At the same time, the symbolism is not to be a mechanical repetition of old forms, but a vivid personal insight into the heart of things. The lead scheme should be considered, as it emphasizes the rhythm of line and controls the masses of colour. Leads of various widths should be used, in proportion to the size of the window. The lead is not to be considered simply for its use in holding the glass together, but as the most important factor in the design. It is the skeleton of the window. It is not unusual for firms to employ outside people to make designs, who have no practical knowledge whatever, but who can turn out an attractive design or a pretty piece of colour, calculated to deceive the unwary. These designs are to be known by the utter absence of any lead scheme, of the use of which the designer is profoundly ignorant. The result is that the window, usually carried out in the commonest glass, is not a bit like the design. There is one fatal error that must be avoided in putting in the lead lines. I allude to that pernicious practice of putting in curved lead lines when a round object like an arm, or a rounded fold of drapery, has to be cut on account of its length, or to obtain variety of colour. In the case of an arm the curved leads look like bracelets, and in long, straight drapery folds the curved lead lines used in alternate folds give the drapery the appearance of corrugated iron. One must never forget that a window is a plane surface, and that round objects must be contradicted by straight leads. Before the cartoon can be made, sizes and templates of the window must be taken. The height from point to sill and the width, with laths. The templates are the shapes of the heads of lights from the spring line, and of the tracery, cut out of brown paper. These will be sight size, to which about ⅛ in. must be added all round to go into the groove. Is it necessary to say that a cartoon should be a fresh inspiration for every window? I am afraid it is, as some firms have no objection to using a cartoon a dozen times over. It would not be a bad plan for architects to insist on seeing the cartoons for every window they order. The cartoon should be made in sepia, as more nearly approaching the tracing and painting of the window, with the leads in black, and their proper widths. It should have a bold significant outline, even for the features, with a little shading, and not washy lines simply as a guide for the painter. The outline is a characteristic of stained-glass of any virile sort. The cutline from which the glass is cut and afterwards leaded on, must now be made from the cartoon. The cartoon is laid on a bench and semi-transparent ammuni-

tion paper laid over it. One then traces over the centre of the lead line with pencil, afterwards going over this with a brush in black ink. This gives one the heart of the lead—the skeleton of the window. Nearly every piece is now cut in sheet glass, to be used first as a "pounce" and afterwards to be painted on and fired. The exceptions are those pieces of "tint" or light colour that one can see the lines of the cutline through, and consequently can be cut from the cutline, and they will also be painted on. The method of using the "pounce" is to hold a sheet of coloured glass, which is generally varied in tone, up to the light, move the "pounce" over it until the exact place that you want cutting out has been found, then mark round it with a piece of French chalk. Hand this over to the cutter, who breathes on it and pounces round the shape with a pounce bag containing powdered whiting. Still holding the "pounce" firmly, he marks round it with a pointed piece of hard wood, and removing it its shape is found outlined on the coloured glass. The other use to which the sheet glass is put, is to paint on it instead of the coloured glass. It is a rule that the better the glass, the less it will stand the fire. Besides the general loss of brilliance, all streaks or other variations have a tendency to go darker. Gold ruby is an impossible colour to fire; besides the aforesaid loss it actually changes colour, becoming a hideous pink or magenta. Venetian opal, too, is an impossibility. No glass improves by going into the kiln, but sheet-glass suffers least, as it is harder than coloured glass generally is. In glazing, the coloured glass is kept in front of the painted piece, so that, besides preserving the paint from the action of the atmosphere, it has something of the effect of varnish on a picture, adding to the transparency of the shadows. We have now reached a most important section of the work: the selection of the glass. This I hold to be the artist's most individual task, which he cannot delegate to any one. The usual way in firms, is to have the different colours in numbered racks; then the master numbers the cutline, and the cutter goes to the corresponding rack, and chooses any sheet and part of a sheet he likes. What idea can the cutter have of the relation of each piece to the whole, or how one colour will affect another—a matter of the utmost difficulty in stained-glass? Colours and tones affect each other enormously, and demand the greatest care and experience. In selecting, every lead must be taken advantage of to vary the adjoining pieces. Of course, the master makes alterations when the glass is on the easel being painted, or even after it is leaded up. One hears of quite heroic attempts in that direction—of one master who had a figure cut over three or four times before *he* was satisfied. It was very good of him to take so much trouble, but what bungling not to know what he wanted at first. How can that warmed-up colouring give one the exquisite thrill of the tingling grip of the artist's hand, where every piece, however varied or unexpected, seems inevitable? We will urge this reform in the interests of the masters themselves. We will tell them that in denying themselves the pleasure of selecting every piece of glass they miss the highest rapture in the production of a stained-glass window; even at the cost of a smaller output, and consequent diminution of profits. We must save them from themselves. That pernicious method also favours a great fallacy—that the light and dark of a sheet of coloured glass should be utilised to give the light and shade of a drapery. *This* is to make a window pictorial, and leads to general flabbiness of colour. Now, the principle of colour in stained-glass is contrast, one piece throwing up another. Only by this means can one display the jewel-like character of the material. This principle of contrast applies not only to the light and dark of a colour, but to a mixture of contrasting colours or tints, enhancing the beauty of one. Take a yellow drapery, for instance: there should be a dominant note of rich, pure yellow; then the colour branches out on each side, as it were, on the one side to the greens, and on the other to the reds. These are not to be gradual changes, but sudden contrasts, a greenish yellow against a reddish yellow, for instance, and there must be contrast in values as well. There is no end to the variety that may be imported into a colour, so long as the impression of the one colour that has given the key note remains. This method, besides preserving the essential glassiness of the material, gives a grip and subtlety to the colour which can never be attained by the light and dark of one colour. For the necessary breadth of effect, large masses of colour with the utmost variety within each are essential. White draperies should be treated in the same way, a mixture of warm and cold tints, the warm or cold predominating as is found necessary. For flesh I use various tints, in accordance with the character represented or the colour or tone required. There is absolutely no restriction with regard to the colour of flesh (which, of course, must be in the glass and not painted on), so long as it harmonises with the scheme of colour. I generally cut angels' flesh out of green tint, of various depths as they approach or recede from the spectator, which all helps the necessary far-removedness of supernatural beings; the flesh of Christ generally out of warm tint; and other living beings out of tawny or red tints, as the character demands. In early work a deep brownish pink was used throughout for flesh; the nimbuses were cut off the heads and in different colours. The objection to this is that all the flesh comes at you at once; besides, it is quite mechanical. I think of a modern imitation of this period, where, in one of the little subjects, the figures are under water, and the flesh is as red as that in other subjects! Rightly or wrongly, it would be impossible for me to do a thing like that. In Perpendicular work, and, of course, its imitations, the flesh, the white draperies, and the canopies and bases are all cut out of the same white, which all rushes together, and leaves the little bits of coloured drapery stranded. With regard to the heads, they are cut out of the same piece of glass as the nimbus and painted on, and the hands and feet are frequently painted on a piece of white drapery, and not cut off. An impossible style, if strength, tone, and character are considered essential. It may be thought that my treatment of flesh is pictorial, but it is not so. It is just as much a convention to cut the flesh of Angels out of cold or cool tones, and that of living beings out of warm tones, as to cut them indiscriminately out of one tint; but it is one which lends itself to greater harmony. I know a church filled with figure subjects where all the flesh is cut out of ruby. This is a convention if you like, but a very hideous one. Another very important point to be considered while selecting, and which has never hitherto been thought of, is that of *timbre*. That is to say, brilliant objects should be cut out of brilliant glass, dull and solid objects out of duller, more opaque glass, that would suggest solidity without having recourse to paint, so that even the deepest tones of a window may preserve their translucency. The various materials must be regarded as the instruments of the orchestra, each of which has its individual tone colour, or *timbre:* thus there is the brilliant sharp colour that would bring out a melody like the oboe; then the more mellow but still rich colour that would suggest the violins; then material of such tone and texture, suitable for background purposes, that would suggest the lower strings and drums; again, a rich Early English gold ruby that would suggest the thrilling tones of the trumpet. All these should be welded together, in like manner, to produce the effect of a rich, mellow, and powerful symphony. The glass is cut with a diamond or a hard steel revolving wheel, assisted with pliers to groze or trim the glass to shape. Glass varies considerably with regard to the ease or difficulty with which it may be cut; but it is a rule that the better the glass, the more difficult it is to cut. Think of cutting glass half an inch, or more thick, to a shape: in such cases even pincers have to be brought into use. I believe one reason why Powell's glass is not more used, is that it is not so much annealed as other makes of "Antique." It is consequently more brittle, and can be cut with less certainty. Thus, to the greater cost of the best material must be added the greater cost of cutting and the waste in broken pieces; to which add the cutting of the sheet, and the extra pieces of colour for plating. We have now reached the painting stage. The first step is to trace the outlines of flesh and drapery, of course, in a vitreous colour, viz., oxide of iron, ground in water, and fattened or made workable with treacle. Lay the cartoon on the bench, and you will be able to see the lines of it through the flesh tints, the light colours, and the sheet-glass which you are going to paint on. When traced the glass is given a comparatively light or tacking fire. We now require a large piece of plate-glass, to be used as an easel glass, to which the glass that has to be painted is affixed with a mixture of beeswax and resin, made hot. The coloured glass may also be added, and as this is the first time we have seen all the colour together, alterations can be made in it at this stage, if necessary. The colours used for painting are of an umber or earthen sort, though the oxide of iron can be added to give body. It must be remembered that the colours of the window are in the glass, and that the colours for painting are simply different degrees of warm and cold shade tints. A window is usually painted in one colour throughout, but that need not necessarily be so. The tone of colour can be adapted to different objects. For instance, a cold white can be painted in a cooler tone, and in some cases a pure black can be used. The colour, which is again prepared in water, but with gum as the medium, is laid all over the glass in a flat matt, which, while moist, is stippled with a tool called a badger. This stippling gives a granulated surface which helps the texture wonderfully. When dry, the colour is gently loosened with the finger where the lights should come, and dusted off with a soft brush. As much as possible should be done with the finger; it gives more character and better texture. This process of modelling the lights is continued with hog-hair brushes, and a quill to take out the high lights; the flat tone should be left for the half-tones and shadows. When fired and stuck up again, the shadows are strengthened with oil colour; the same colour prepared with turpentine, and fat oil of turps as the medium. Especially is this necessary in the flesh, to give character and expression. The dry surface of the glass is first washed over with oil of tar, to let the colour flow freely. It is not essential that every piece of glass should be painted. On the contrary, if there is sufficient tone in the glass, it is better not to paint, but to let the varied markings and tone of the glass speak for themselves. The shadows will then possess more translucency than if painted. Light glass heavily painted is much more obstructive to light than richly coloured glass but slightly painted. I cannot leave the subject of painting without alluding to a kind of painting that is no painting. I mean "Backing," as it is called. This is, to lay a matt of colour on the back of the glass, and then partially remove it, for no other purpose than to make the glass look dirty and old; to give it, in fact, that tone which the glass itself lacks. From the assiduous way in which some firms plaster the back of their windows with colour, anyone would think that the chief attraction of the old glass was derived from the accumulated dust of ages. The parts that require it are now stained. Although this is called stained-glass, and we used to be called glass-stainers (we are all artists in stained-glass now), there is only one stain—a preparation of pure silver, which stains the whites yellow. It is mixed with yellow lake to reduce its strength; and this, being a vegetable colour, burns away. When fired again, the glass is now ready to be put together by the glazier. As already remarked, it has been usual to regard the lead as simply a means of holding the glass together; consequently, to employ an insignificant lead throughout. But if we regard the lead as an important factor in the design, we must use leads of various widths and of a bolder character. The proportions of the lead must be adapted to the size of the window and its distance from the spectator. That must be a very small window where $\frac{1}{2}$in. is too large for the principal lead. In large windows a $\frac{3}{4}$in. may be the principal lead; and if the window is going a great height, 1in. or more will not be too much. There must be no idea of shuffling the lead out of sight. To hide the lead, and use as little of it as possible, is a characteristic of the pictorial window. A window can hardly be described as pictorial, where the lead is a prominent feature. Where leads of different widths are used it is necessary to mark the cutline with different coloured chalks—say a blue for the $\frac{3}{4}$-in. lead, a red for the $\frac{1}{2}$-in., while the black ink remains for the $\frac{3}{8}$-in. lead. The leading recalls a danger to be avoided in designing—not to make every piece of glass of so near a size that at the proper distance one seems to see the glass through a wire trellising. This is a danger the mosaic dispensers are apt to fall into. The leading of the double glass, and of the thick and varied

pieces, offers difficulties. Leading becomes an art. One has to use a very broad hearted lead, but sometimes that is not sufficient: in such cases one has to make a still broader heart by cutting the leaf off two calms of lead, and soldering the two hearts together; or by paring the leaf away to let the glass into the heart, and then soldering a fresh leaf over it. Thus you see another process that is considerably extended by our determination to use the best material. The lead is then soldered at the joints, and the panel is handed over to the cementer. It would be more correct to say the puttier. Whereas in ordinary work of single glass the leads are filled with cement, (a thick paint which ought to be composed of whiting, linseed oil, white or red lead, dryers, and lampblack to make it a lead colour), in this sort of work every piece of glass must be puttied on both sides. Copper ties are now soldered to the lead to twist round the bars, and the window is ready for fixing. Although I am explaining my methods thus frankly, I have not much fear that they will be copied. Not one of them is in the direction of time or material saving, and any one who copies them will do so at the peril of decreased profits. In stained-glass, as in the other arts, if one would do good work, one must never count the cost.

Now that I have reached the last stage of my discourse, that section which is to deal with the Stained-glass of the Future, I am confronted by the hateful task of having to say something about my own work. It is unfortunately necessary, because I have to show that the ideas I am about to put before you are not mere impracticable theories, but the result of working in the best material. Just as Wagner, when writing his theoretic works, deduced examples from his earlier Operas (the spontaneous outcome of his artistic need, thus proving that they were not the result of any preconceived theories), so I must describe to you my first excursion into the unknown Land, the Land of Mystery, of Light and Tone. The window I am about to speak of was executed some few years ago for a lady who suggested the subject, "Wotan calling up Erda," from the Third Act of Wagner's "Siegfried." I must confess that at that time the subject seemed an impossible one for Stained-glass, and perhaps you will agree with me when I quote the stage directions. "A wild region at the foot of a rocky mountain which rises L steeply. Night. A storm rages. Lightning and thunder, which last then ceases, while for some time lightning continues to flash through the clouds. Here the Wanderer enters. He strides with resolution to the mouth of a vault-like cavern in the rocks at front, and there stands, leaning on his spear, while he directs his invocation towards the cave. A bluish light glows in the rocky chasm. Illumined by this Erda very gradually rises from the depth. She appears covered with hoar-frost; her hair and swathings emit a glittering light." Now, the *crux* of the whole thing was the supernatural light in which Erda appears, and I must say that I was very fortunate in finding at that time some early English, which I tempered with Powell's Blue on venetian opal, that realised the effect perfectly. To my surprise, therefore, instead of this subject being impossible in stained-glass, it became clear to me that this was precisely the medium in which effects of light were possible and could best be realised. I found there were possibilities in the best material which had never been dreamt of. Besides the supernatural light and the hoar-frost on the hair and swathings of Erda, it was possible to suggest the tone of night with glass alone: the vigorous action of Wotan, with his cloak and "beard blown by the night wind," contrasted with the mystical stillness of Erda; also the flash of red in the sky suggesting the subsiding storm. Pictorial, you will say? Not at all. A pictorial window would have been a representation of the scene as it takes place on the stage. But this is an independent conception, conceived in the terms of the material, and producing a result which could not be attained by any other medium. Let us be quite clear on this point. A stained-glass window becomes pictorial when it does such things, or in such a manner, as can be done as well or better in another medium, *e.g.*, in a picture or wall-painting. It follows from this that there is a class of subject which is peculiarly the province of stained-glass; that is, the supernatural, in which mystery is the most vital element, and in producing which, effects of light — with which in stained-glass we are dealing directly — are the chief factors. I will just summarise the ideas I have gained by carrying out that "impossible" subject. That the subject of a window should be supernatural and symbolical. That mystery is the highest and indispensable quality. That to produce that, effects of light and tone are the chief elements. That there must be a definite tone-colour, and keynote of colour. The tracing and painting must be bold and expressive, wherever it is needed; but, as far as possible, the glass must be left to speak for itself; and the leading must emphasise the important lines of the design. There are some who believe that the subjects of a stained-glass window are a matter of perfect indifference; that any trivial thing will do for stained-glass; and who are quite content to fill a window with a number of single figures. What a colossal waste is that big twelve-light window I have in view! Four tiers of single figures. Eheu! Hinc illæ lacrymæ! What an almost matchless opportunity for a "Last Judgment." But no! That would be too pictorial (and difficult). Let us go on with our kaleidoscopic inanities; let us produce a window that is so dull and uninspiring that one never wants to see it again, even if the material itself were worth looking at. No wonder that stained-glass is considered such a supernumerary art, while such things are being done. Yet, why should stained-glass alone stand still and stagnate? Change is the law of progress, no less in art than in human society. If we are to have progress, it is essential that children should differ from their parents; although parents, who think themselves perfect (and even those who clamour most for progress), try to defeat that law, by trying to make their children after their own image and likeness. But the fact is that no parents are so good that their children may not be better. Where, again, would the art of music be to-day if it had been considered imperative to imitate the first attempts at Opera, with the undeveloped orchestra of that day. We should not have had the crowning glory of the Music-dramas of Richard Wagner. It is just as absurd to imitate old glass as it would have been for Wagner, when dealing with a colossal and complex subject like "The Ring," to have confined himself to the orchestra of Monteverde. Or imagine Tristan and Isolde conversing in Gregorian tones, accompanied by the sackbut and psaltery. Away then with these monstrous delusions which have paralysed stained-glass so long: "that there is no glass like the old glass, and there will never be any windows like the old windows." Away with the Imitation that paralyses the imagination, and let us bring whole hearts to the study of the best material and the natural development of early work, when, as I imagine, there was only one kind of glass—the best the people could make. What then is this natural development of Early work which I venture to call "The Stained-glass of the Future"? And why is our development to spring from Early work, and not from Fifteenth Century and later work? Because the latter was no intrinsic development of the former, but simply a repetition in a more elaborate and ornate form. It is still a window of single figures or small subjects connected with canopies; consequently it leads to an *impasse*, a *cul de sac;* there is no development possible on those lines, so it *must* be ignored. Let me draw a parallel to the development of the Music-drama. First, we have the simple heartfelt strains or songs, loosely connected, answering to early work. Then there is the period of Italian opera; still the aria form, loosely connected, only more elaborate and artificial, consequently no vital development. This corresponds with work of the Fifteenth and subsequent centuries. Then we have the Music-drama, a development of the simple song through continuous orchestral melody until it fills the work as an organic whole; giving also to each work its special tone colour. For this latter quality, varied and distinct, yet in keeping with the subjects, I need only refer to "Die Meistersinger," "Tristan," "The Ring," and "Parsifal;" and over all the individual style of Richard Wagner. I suppose no apology is needed for my allusions to Wagner and his works, as every man of culture must know something of them; but I have found them of the utmost value, as in them the great principle of unity in variety is so remarkable a feature.

And now, to return, from my parallel, to the development ahead of stained-glass. In the first place, I should regard it as a development, that, in an age of commercial production, we consciously choose the best material. Another very important development would be that of regarding a window as a whole—one window, one subject—and not a series of small windows, as the single figures connected by canopies suggest. Owing to the kindness of your executive, I am permitted to bring some designs and cartoons, which gives me an opportunity of dealing more effectively with the subject of composition in a window of one subject, and without canopy and base. In the first place, it must be distinctly understood, that my desire to treat a window as a whole is not due to any impatience of the shafts dividing the window into lights; but to focus the attention on one subject, instead of frittering it away on a number of single figures or small subjects. The shafts, therefore, must not be ignored, but clung to, as the ivy clings to the oak. Broadly speaking, the linear design, if a window is to have its due monumental character, should be more or less Perpendicular, following the lines of the shafts. Impersonal objects, such as angels' wings, trees, clouds, drapery, the lines of the landscape, may run through two or more lights, to help in binding the window together; but the human figure should very rarely extend beyond its own light. The colour design, however, should be horizontal—in strata, as it were. That is to say, the strong colours should be concentrated on the base of the window, as in a musical composition the bass is the most important thing; in the middle more neutral tones can be used; and in the upper part lighter and more ethereal tones, thus carrying the subject away into boundless space. The canopy must go, since it is no longer required to divide a window into sections, and as its lightness interferes with the tone of the window. You will see from this set of designs the difficulties one has to contend with in fitting a subject that demands a centre light into a window of an even number of lights. This suggests the idea that the architect, when he has a church to design, might do worse than confer with the glass-stainer as to the scheme of windows, with the view, in some cases, of adapting the shape of the window and the number of lights to the exigencies of the subject. Perhaps this is a counsel of perfection, but, at any rate, you cannot go far wrong in providing us with a centre light. Most subjects from the life of Christ demand a centre light, so, instead of four and six-light windows, give us three, five, and seven lights.

If, that is, as your President very happily expressed it at your last meeting, you are resolved to think out your work to the uttermost detail; and yet stained-glass can hardly be called a detail, it is so important in itself, and also in its effect in modifying the whole aspect of the interior. I feel very strongly that the architect should get out a scheme of subjects for all the windows in his church, whether there is any idea of them being carried out at once or not. The subjects would not then be such a hideous and incoherent jumble as they generally are now.

Another development would be a firmer grasp of the colour scheme, based on each window having a definite tone-colour in harmony with the subject; and a keynote focussing the colour. Its symbolism must be reconsidered and developed, so that it shall appeal to the Spirit of Reverence (if any such exists), of to-day. Its drawing must be simple, dignified, and natural, without affectation of mediævalism. It will be a development to use paint with discretion, and only where it is necessary to give tone and contour. And, finally, by a bolder system of leading show that we regard it as the main factor in the design. Do not think, therefore, that I wish to ignore all tradition, and expect stained-glass to begin *de novo* from this moment. On the contrary: it is necessary to study good examples, and see what is the natural form of expression in this art, and what effects have been obtained with limited means. But surely one may study without falling into the rut of imitation; and let it not be forgotten, also, that our knowledge is increased by learning to avoid many things that have gone before. On the other hand, do not run away with the idea that stained-glass is to be learnt by simply looking at old windows. Before any one can make a cartoon for stained-glass, before any one can know what style of drawing the painter requires, he or she must

have had practice and experience in tracing and painting on glass. And yet, within these last few years, a horde of self-styled artists in stained-glass has risen up, and, like a plague of locusts, covered the land with works which almost sink into the ground for very feebleness. Stained-glass has become the happy hunting-ground for all sorts and conditions of crafty men; black men, black and white men, wall-paper men, wall-painting men, art students, particularly from those centres of light and leading where there is no technical teacher; any one, in fact, who with hand or foot can wield a pencil; and who, without ever having handled a piece of glass, can presume to colour designs and cartoons for this most rich and subtle of mediums. And yet these people float! A state of affairs which amply justifies my opening words: "that there is scarcely any subject about which there is greater ignorance than Stained-glass." I admit that it would have been more satisfactory to myself, and, perhaps, to others, if some one else could have written this address; but as I said at the beginning, "only those who have worked in the best material are qualified to speak of the possibilities lying dormant in it."

Let us, then, throw ourselves with enthusiasm into the task of making the best use of the best material, so that by developing it as we develop every other phase of the Art, we may produce, by our works of imagination and mystery, those feelings of exaltation, of rapture and devotion, it has hitherto been the province of divine Music alone to impart.

Mr. Lewis F. Day, in proposing a vote of thanks to the lecturer, said he had listened with great interest to the paper, in which there was a great deal that was very true, and which wanted saying. He specially agreed with the lecturer in emphasising such facts as that the glass is the main thing, and not the painting, for no amount of painting would make bad glass good. Glass painters knew that the glass must be good, but everybody did not know it. It was also true that as good glass could be got now as ever, and that the glory of glass was its colour. He was glad that Mr. Sparrow had insisted on the fact that leading was valuable in stained glass—that it was a help to the artist, and not, as was commonly supposed, a hindrance. It was well, too, to consider the consistency of glass, for the artist who knew the material could produce a great deal of effect by means of glass that was semi-opaque, transparent, and so forth. He agreed, as every one must, with the lecturer's censure of what he called "backing"—they used in his day to call it "antiquation"; it was a miserable sham, and a cheap one at that. He endorsed the lecturer's commendation of Powell's and Prior's glass, although he thought that there was other glass to be got quite as good. Rust used to make as good glass as any one, but that was a long time ago. The lecturer said rightly that best glass could not be got without paying for it, but the costliest glass was not always the best, and a man who knew what he was about often could get, in cheaper stuff (which was found at the bottom of the pot), some beautiful glass, which the makers did not intend to make. As to gold ruby, the lecturer may have had some other colour in his mind than what he (the speaker) had. He did not agree that copper ruby was comparatively vulgar. The most glorious ruby, in fact, ever produced was copper ruby. Gold ruby, although very beautiful, had to be used very judiciously; it was like one of those poisons which, if used judiciously, was good; but which, in general, was dangerous. Still, the lecturer might have in his mind some modern make of gold ruby that he (the speaker) did not know of. The lecturer's remarks as to architects specifying good glass were to the point. Architects should know more about the cost of glass. In his experience an architect specified some glass at 7*s.* 6*d.* a foot, and when told that that would not do at all, he remarked, "What a pity I did not know, I could easily have got 2*l.* a foot for it, but I cannot alter it now, for I should look a fool"—and so he would. Young architects were apt to make a mistake on this point, and when they had to design stained glass, they should first get to know what it costs. There were many hints in the paper which would be useful to those who wanted to know. He sympathised with what had been said about the glory of rich glass and the desirability of using it wherever possible, getting shades with the glass instead of "mucking" on it with paint; and glass-stainers went astray from ideal decoration when they took to the paint. As to whether paint was responsible for thin glass or vice-versâ in the fifteenth century, he was quite of opinion that the thin glass was due to the painter. The painter wanted the thin glass to show how clever he was. He did not go with the lecturer in his criticisms of white windows. He loved the early work quite as much as the lecturer did, and he loved and enjoyed rich glass; but there was Salisbury and York Minster (with the five sisters window), and many fine Perpendicular windows, silver lights, with jewels of colour flashing in it here and there; he could not think of these and think little of white windows. He did not care for the saints in those windows: in the window at Winchester the saints were all "smashed up," and they could hardly be recognised, and as to canopies, they were mistaken in idea and unimaginative; but he saw beauty where Mr. Sparrow apparently did not; and when he looked at the windows he forgot his prejudices in favour of early glass. The effect of those big Perpendicular windows was to his mind only less than that of the finest early glass; and that effect was decorative and of a kind for which there was occasion nowadays. They were to gather from the lecturer that the glass of the future was to be deep and rich, but we had got accustomed to light windows now, and it was not only cheapness that induced people to insist on having grisaille windows, it was love of light, and it was no use preaching against that. The glass designer had to take that into account, and do the best he could with it. There was not always the opportunity for deep, rich windows, but there was for light windows. There was mystery in light windows, quite as much as in the coloured work. It was all very well to say that there was nothing like jewellery, but jewels were rich and rare, and for his part he was quite content with silver, or silver and gold. Mr. Sparrow called the light windows chilly, but he (the speaker) did not feel that; and his opinion was that the glass of the future would not be deeper or richer, but lighter and more brilliant. He agreed with Mr. Sparrow's theory of the treatment of glass, though he thought that the principles advocated were more adapted to work of a barbaric kind than to work of a pictorial character—he used the word "pictorial" in a good sense, such as that of Mr. Sparrow. Mr. Sparrow claimed rather too much when he insisted on the right of covering the window with one big subject. To do that was a privilege that the glass painter might occasionally indulge in, but if the architect saw fit to design a window with mullions, those mullions ought to be taken into account and treated with more respect than Mr. Sparrow seemed to be inclined to treat them. A big Perpendicular window was a whole, and it was designed as a whole, the divisions being part of it. Those divisions wanted, to some extent, emphasising, or acknowledging more frankly than Mr. Sparrow seemed inclined to do. Mr. Sparrow had rather injured his case, which was a good one, by overstatement. He said that there was no mystery without stained glass. Had he been to St. Mark's, Palermo, Ravenna—had he seen any fine old church in which there was mosaic work? The mystery in such buildings was quite as great as in buildings where there was stained glass—and he said that as a lover and student of stained glass. As to the Wagner theory, that was a personal matter. He thought he should be more influenced by Handel in church work, and in domestic work by Beethoven and Mozart. As to imitation, no sane person wanted that; but change might be good or bad, and it was no more original to follow a new idea than to keep to the old ideals. Old ideals did not change, or if they did, so much the worse. The old ideal in glass was to glorify the light which shines through the window; that should be the ideal to-day, and he hoped it would be the ideal of the future.

Mr. J. D. Crace, in seconding the vote of thanks, said he agreed with a great deal that had been said, and he thought that Mr. Sparrow's general principles were unexceptionable. He was a little taken back by the title of the paper, because the processes which Mr. Sparrow described were the processes which had been going on since the thirteenth century without any great variation. Mr. Sparrow had taken for granted that canopies must go, but he must have overlooked the object of them, as Mr. Day seemed to have done. The great value of canopy work was not its ornamental treatment, but as a connexion with the architecture. The great value of canopies throughout the fourteenth and fifteenth centuries was that the subject and colour of the window were so connected, and that that was the principle was pretty clear from the treatment which prevailed in regard to fresco painting. In the great fresco paintings of the fifteenth century—which might be considered to be the best period of decorative fresco painting—the subjects always contained sufficient architecture to connect them with the architecture of the building in which they were placed; and if the end of a church was decorated with a series of frescoes, the pointed architecture assisted the idea that they were connected. In that way canopies had a great value, which he should be sorry to lose because they could not be accounted for in a rational manner in relation to the subject, for the glass must be looked at from two points of view: (1) the artistic treatment of the glass, and (2) the relation to the architecture. He could not agree, either with Mr. Sparrow's ideas as to why glass was thinner and the colourings paler during and after the fifteenth century. The colouring was often less intense, but that was largely to be accounted for by the circumstances under which it was destined to be used. So long as the windows were, perhaps, 20 ft. high and 5 ft. wide at the outside, and consisted of two or three lights only, great intensity of colouring, and very beautiful colour, was quite possible and consistent, but in the case of great cathedral windows, sometimes 70 ft. high and 30 ft. wide, the enormous area of the window made it necessary to adopt a different treatment and a different sort of glass. It was not only the question of painting on the glass—it was quite true that the glass was more painted on; but the reason for that was that the windows were so large that they could afford more painting on. In speaking of glass of the fifteenth century as representing more or less decadent treatment, he thought that was overlooking the whole of the Italian glass. Think of the beautiful windows in the choir of Sta. Maria Novella, designed by Filippino Lippi, where all the qualities of the glass were obtained, where the treatment of the figure was beautiful, and where there was a very careful and beautifully thought-out ornamental treatment! In the cathedral at Florence there were upwards of thirty windows, designed by Ghiberti, and at least one by Agnoto Gaddi, which would be an earlier one. Again, an artist of a later period, Bernard van Orley, a pupil of Raphael, designed a great deal of glass, and he had to deal with windows of an enormous size, but he treated his subjects in proportion—they were no longer windows restricted in size, but they covered an immense surface; as, for instance, in St. Gudule, Brussels. These were facts which should be taken into account in criticising the quality of the glass during the fifteenth and sixteenth centuries; and as to that particular quality of play of light obtained by the imperfect piece of glass what could beat the windows of Fairford, which were very late, quite at the end of the fifteenth century? Taking this into account, it would not do to condemn with a stroke of the pen any period of art. All periods of art had their reason for being, and the details and different features of them were usually interlocked and dependent upon so many causes that to pick out one and say that the material (the glass) of this period is not so good as the material of another, while it was true, it did not follow that that was so because the artists could not get anything better; it was because the style of architecture, and the area to be covered by the window, required a different sort of glass. He thought Mr. Sparrow had been hard upon the master glass-stainer who was not satisfied with his figure the first time. We all ought to do a good many things we do not do, and know a great many things we do not know; he had had a great deal to do in experimenting with colours, and he did not believe that any one entirely knew what a coloured work was going to look like until it was in position; and especially was that the case with the glass window. The position of the window had a great deal to do with the ultimate effect—projecting buttresses or opposite buildings might interfere with the direct light, and might

upset the scheme of colour. It was not always possible to know what the conditions were under which the glass could be used. He agreed with Mr. Day about Wagnerian music and art. There was one point in which the similarity held good: admirers of Wagner were always inclined to be rather hard on all other musicians, and Mr. Sparrow's ideas about glass made him a little unfair, perhaps, to the glass which had not been worked his way. As to imitation, no one wanted servilely to imitate the old glass, but at the same time no school or period of art could afford to ignore all the experience of men who had gone before. For each man to begin at the foot of the ladder was a poor way to progress, and he thought it would be found in art, as in most things, that the more we can avail ourselves of what has been done before, the further we shall go ourselves.

Mr. H. P. G. Maule, hon. Secretary, then read a communication which had been received from Mr. N. H. J. Westlake.

Mr. Westlake said he had carefully read the paper, but he found little light as to the future, such as he had expected from the title of the paper. Possibly the lecturer thought, as he did, that the best future would come by doing our best, day by day, without straining, although striving. Straining for novelty was too painfully shown in modern exhibitions of glass and wall painting cartoons; it destroyed the repose so valuable in good art. He criticised the prominence given in the paper to the names of certain glassmakers. He was sure it was not done in the way of an advertisement, but it necessitated the omission of the names of other glass-makers whose productions were not distinguishable from those mentioned. The practice of "plating" was also advocated, evidently as practised by American makers. It was a very pernicious form of work, and ought with proper material to be unnecessary. It was especially pernicious on the point of durability, as the lead of a window was the first part to decay, and then there was the probability of the falling out of one of the plates. Moreover, it adds to the weightiness of a window. A window of good stout glass and lead had always a tendency to cockle irregularly, and to tear itself from its copper bands. This irregularity of weight should be obviated and not exaggerated. As to the general principle of the lecture, it appeared that the lecturer's first thought was the effect of an individual window, irrespective of the general "coup" of a number of windows—say, in the aisle of a church. Here, unless there be some rhythmic bond, the whole of the side of the church loses the proportion of the windows to the wall and to each other. This rhythm was found from traditional practice to be best produced by the repetition of a dominant feature, such as was effected by what is called canopy work. Regardless of what the lecturer said of Perpendicular work, or even early Renaissance work, the result was most perfect in some churches in these styles. Witness the old glass in the antechapel of New College, Oxford, and in the work of Jean Cousin (a great artist) at Sens and Paris. It must also be remembered that "early glass," such as that at Canterbury, Bruges, Chartres, Florence, &c., was heavily coloured. It was introduced here from France, where the light was better; but even in France on a dull day such glass as that at Chartres prevented anything else being seen, and much of it was removed from our own churches in the fourteenth century for that reason. As to he relative cost of good work, the question of style had nothing to do with it. Good Perpendicular or Renaissance glass was the most expensive, as white glass, if of any value, required the best painting (although much that was done now was badly manipulated), and where there was one first-class glass-painter, there were fifty moderate cartoonists and thousands of good glaziers employed. Early glass had the least technical painting value. He could not enter into musical parallels—such as the likening of golden ruby to trumpet tone; nor could he admit that "mystery" was the most valuable ingredient in a painted window. Neither did he see why angels, being supernatural—a word that had no art meaning—should be green-white, whilst our Lord's flesh was warm white. The whites of different tones running together in a window were not a defect, but gave the effect of breadth, whereas when everything was cut out and juxtaposed with its opposite, spottiness resulted, such as one sees in all second and lower class work. That portion of the paper concerning the technical making of windows was that usually followed by all respectable makers of windows. There were, however, slight differences of practice in the selection of tones and colours with different artists. No artist in these days went by numbers or water-colour drawings for his tones. Neither was "sepia" the best medium for all cartoons. He did not think that much knowledge was gained by reading technicalities; nothing but long and intelligent practice produced the best results. And here he entirely agreed with the lecturer, who lamented the immigration into painted glass ateliers of men who knew nothing about its requirements, but who were ever ready to teach and say what art is and what glass should be. They were of both sexes, and their name was legion.

Mr. E. J. Prest said that the point which struck him most about the lecturer was that he seemed to have failed to grasp the architectural possibilities of stained glass, and seemed to overlook the fact that we must take into consideration first of all, what the style of the church is, and what the architect's ideas in designing and building the church were. Glass suitable for an Early English church would be very unsuitable for a Perpendicular church, and glass suitable for a very strict rendering of Perpendicular such as was to be seen in the work of Messrs. Bodley & Garner or Messrs. Austin & Paley would not do for such a free rendering of Perpendicular as we saw in Mr. Sedding's churches, for instance. It was a very important thing for glass painters or designers first of all to grasp the character of the building. Mosaic treatment of stained glass, although it was very beautiful, and for many purposes seemed to be quite the right thing, and certainly a step forward, was in some respects quite the wrong treatment. He entirely agreed with other speakers in saying that it would be a grievous pity to do away with canopy work, which we had for so long admired. We could not help being impressed by ancient windows in which canopy work was seen, such as those in Fairford Church and elsewhere. He did not quite follow the lecturer in regard to the use of white glass in Perpendicular work. The lecturer seemed rather to infer that the glass was flat and of one texture, and that in modern adaptations of Perpendicular work the antique glass was also flat. The great beauty of modern stained glass, as well as the old, was the difference in the make of glass and the tones used. We should not use one white in a window, but a judicious blend of blue and green tones of white. As to the makes of glass, he thought an injustice was being done, perhaps unintentionally, to the beautiful glass being made by Messrs. W. E. Chance, who really made most beautiful glass. Their streaky whites could not be surpassed by any one in the world. There was also a small firm of Glasgow makers, who made a glass which they called St. Mungo glass, which was very beautiful and which gave some good effects. It was sometimes not so brilliant as the Early English glass, but there were great possibilities in it by judicious selection. He did not altogether endorse the lecturer's sweeping condemnation of the "gin-bottle" treatment in the new cathedral at Westminster. No doubt Mr. Bentley allowed for the toning effect of the fog of London; and when one remembered that every detail of the building was thought out by the architect, even to the smallest detail of the ornamental glazing, they felt that they must respect his work. Again, with regard to a window the lecturer had not named, but which most of them knew pretty well, he could not follow the lecturer in his condemnation of the rows of figures that were placed there. The window in question was a beautiful window of its type, designed and carried out by two of the greatest artists who ever worked together, and the ruby used there for the flesh was not at all out of place, and the tone of the window, the colour scheme, was so intensely rich that the pale ruby flesh, by contrast, seemed to fall into its right place. He was one of those unfortunate individuals who, in selecting glass for a window, made many alterations. He was not sufficiently capable of selecting the glass straight off and putting it up, for one's workshop or studio gave no position similar to that which the glass would eventually occupy, and almost of necessity one found that one's work required alteration at the last moment or as the work progressed. There was, no doubt, a vast future for the mosaic treatment of glass.

Mr. F. Lishman said as to the cartoons shown, the saddle-bars were in nearly all instances omitted, and where shown, they were great distances apart. The saddle-bars ought to be recognised. Where one would like to see glass used with something of the freedom one saw in those cartoons was in buildings not ecclesiastical, and an excellent example of that could be seen in Electra House, by Mr. Belcher. In the vestibule there was a fine mosaic treatment of glass, which was combined very well with the architecture.

Mr. J. Dudley Forsyth said that Mr. Sparrow spoke about glass painting and said that it should not be encouraged because the quality of the glass was so rich in itself. That was all very well, but glass-painting was a very interesting art, and could be treated in such a way that it could in itself improve the beautiful quality of a glass. Glass-painting could be treated in various ways. In a Gothic window the treatment was very different from that in a Renaissance window; the Renaissance window required a more delicate and artistic touch. He did not quite follow what Mr. Sparrow said about stippling. Stippling was done as a rule with a hogshair brush and the badger was used for flattening out the uneven surface. A window was essentially an architectural feature, and no matter what decoration was intended for it it should be treated architecturally. He was not sure that the massing of Mr. Sparrow's colours would lend themselves architecturally to the buildings for which his windows were intended. The massing of colour was a very serious point, and if one had a very hard and deep colour in a window, butting up against the stonework of the architecture, it was very apt to spoil the lines of the architecture. In preparing the cartoons there was an excellent opportunity for very careful drawing. Very little had been said about good drawing. The drawing of the figure should be carefully and seriously thought out, and there was no reason why, because one was drawing for stained glass, proportion and grace of line should be ignored. They should be as seriously studied as were the picture painter's draperies. A figure for a window, although it should be drawn from life, should not be naturalistic: it must be conventional or decorative, because the material in which it was to be executed necessitated the introduction of hard lines, just as the hard lines of a figure on a wall were necessary.

The Chairman, in putting the vote of thanks, said that Mr. Sparrow had given them a fresh, and, in many respects, an original view of the treatment of glass in windows. He had read and listened to the paper with pleasure and profit, and he rather expected it would give rise to some diversity of opinion. On a subject of this sort it was so much a matter of opinion and personal feeling that it was impossible to dogmatise and wrong to attempt to do so. He had the greatest sympathy with almost everything Mr. Sparrow had said, and his cartoons appealed to him (the speaker) in the strongest way. At the same time, people who held different opinions were not necessarily wrong, and he did not think rules and laws should be laid down on a subject of that kind. There was one point with which he did not go with Mr. Sparrow, who rather seemed to look at stained glass from one point of view—*i.e.*, that stained glass is stained glass, and the best kind of stained glass is only of one kind. He could not see that, because if they were dealing with, say, a window in a Gothic church, or Early English, or Perpendicular, he could not see that the same kind of glass would do as that for the window of a Renaissance building. Different treatment altogether would be required, and if they had a highly-finished Renaissance building, with rich marble in it, more delicate treatment of the glass would be required than if they were dealing with a Gothic building. Mr. Sparrow had been hard on the glass in Westminster Cathedral. The reason why the glass there was more or less white seemed to be because the interior was intended to have decoration more or less of the richest character, and it would have been a fatal error to put coloured glass into a richly decorated building. As to leading, most of Mr. Sparrow's remarks would be accepted as axioms. The lead should be made use of in every possible way to emphasise the lines of the design. As to the treatment of a window with many lights in it as one subject, that seemed to be quite the right thing to do. However

many divisions there might be in a window, it was, after all, one window. The mullions and divisions of tracery did not prevent the window being one window, and the most effective treatment would be to treat it as one subject; and the artist who treated it as a great number of subjects threw away his opportunity. There was a suggestion in Mr. Sparrow's remarks that he regarded the window as the one thing in a building. That was an excusable error into which most craftsmen fell; they looked only at their piece of work, and did not regard it as only one item in the whole, which ought to be co-ordinated with all the rest. Otherwise, if one man made his own work the most prominent, all the other decorative features would suffer more or less. Mr. Sparrow's musical illustrations appeared to him (the Chairman) in the strongest way, and they were most interesting and graphic.

The vote of thanks having been heartily agreed to,

Mr. Sparrow, in reply, said that most of the points raised in the discussion were really answered in the paper, and the Chairman had answered others. As to gold ruby, he thought Mr. Day must be confusing it with what was known in Powell's manufacture as gold pink. If Mr. Day had seen the specimens of Early English rich ruby—not pink at all—in daylight and compared them with copper ruby, he would know that there was an enormous difference. The white windows one saw in old work had a tone of age. Mr. Westlake had referred to plating. He (the speaker) found that if he wanted to get a rich window it was quite essential to plate, simply because the demand for good material was so small that one could not get the colours rich enough, or in sufficient variety, without it. As to the permanency of plating, he had always done it and had never had the slightest complaint. One speaker seemed to think that if canopies were done away with it would be impossible to get an effect of continuity in treating the side of a church as a whole; but with a proper succession of subjects one could always bring the thing together, it depended on the choice of subject to a great extent. The great difference between people was as to the effect the window should have. Mystery was the great thing, and by that he meant something that gave one the feeling of devotion. A church window was not merely a matter of decoration; it must be devotional, and have an effect on the worshippers, and the greatest means to that end was Mystery.

The Chairman announced that the next meeting will be held on March 6, when papers on the subject of competitions will be read by Mr. H. B. Cresswell and Mr. A. W. S. Cross.

The meeting then terminated.

CARPENTERS' HALL LECTURES:

ANCIENT ROME IN 1903.

THE first of the Carpenters' Company's spring lectures on matters connected with building was given at Carpenters' Hall, London Wall, on Thursday evening last week by Professor R. Elsey Smith, who took as his subject "Ancient Rome in 1903." Mr. Aston Webb, A.R.A., presided over a large audience, and briefly introduced the lecturer.

The lecturer first gave a brief account of the history of Rome, and, proceeding, said that well might the title of Eternal City be yielded to one with such a history, which, in spite of all vicissitudes and misfortunes, still, after a lapse of 2,500 years, holds a proud position in the world. The buildings of ancient Rome have suffered not only from the ravages of time and the pillage of successive enemies, but from the much more complete and destructive attentions of its own inhabitants. The finer buildings of the empire were, as regards their structure, almost imperishable from any ordinary causes, so massive and perfect was their construction, but some were lined throughout with the utmost profusion of rich marbles, and the mediæval Roman found that these materials could be turned into excellent lime, and so availed himself of the profusion of materials ready to his hand; and even after the revival of interest in Classical learning and architecture which is known as the Renaissance, the Roman popes and princes did not hesitate to use such buildings as the Colosseum as a quarry from which the finest building stones could be procured for their own great palaces. Rome was certainly not destroyed in a day—or in a century; and it was a matter of surprise that so much should still remain to indicate to us the extent and glory of the Rome of the Emperors; but the very ruin it has suffered has helped to retain for us some traces of the work of the ancients, for the level of modern Rome is in many places 30 ft. above that of the ancient city, and, where the original work has been uncovered, patient investigation had brought to light much that helps us to reconstruct in imagination the buildings and palaces and shops of the Romans, and their temples, baths, circuses, and places of public assembly; and where the remains are scanty the deficiency in many cases was partially made good by contemporary records.

In considering the remaining works of the Romans, the lecturer dealt first of all with those works which might be looked upon as purely works of utility. Of these, the earliest were the walls built to enclose and defend the city. The earliest wall, where it is still most perfect, is about 10 ft. thick below, and more above, and it was built on a ledge artificially formed in the rock of the hill about 40 ft. below the summit and rising above it to the level of the upper surface of the hill. The wall had three main gates and a smaller gate, from which a still existing flight of steps led to the summit. The wall was built of stone quarried in the hill, and it showed an advance in construction in the use of squared stones worked with metal tools in place of the irregular stones used in Cyclopean masonry. The next wall, the wall of Severus, was of much greater extent and was a truly stupendous work, of which fragments still exist. A portion of this wall was recently destroyed in the development of modern Rome: it was 9 ft. thick and 50 ft. high from the bottom of the fosse. Elsewhere, where the nature of the ground permitted, this wall, like the early one, was built against the rock face, and portions of this part are also in existence, still standing to the full height of 50 ft. and 10 ft. 6 in. thick. In the upper part of the wall were semi-circular open arches, 34 ft. above the foot of the wall, and probably intended for the use of some engine of war. Of even greater extent was the great wall of Aurelian, built in the third century A.D. to resist the Goths. It was in the later method of construction used in the Empire—*i.e.*, mainly a mass of concrete, faced partly with brick and partly with stone. It still formed in the main the enclosing wall of the city. Its length is about fourteen miles, and it had originally fourteen gates, most of which still exist, and 383 towers, of which only a few remain. The thickness of the wall was 12 ft., and the height in many places 60 ft., and throughout the length on the inside was a vaulted passage provided, like the towers, with loopholes for archers. The towers for a height of about 25 ft. were of solid concrete, and above this were three stories, the floor of the lowest approximately level with the great gallery, and the floor of the highest level with the top of the wall; the towers projected on the outer face of the wall and the loopholes commanded the ground between each pair of towers.

The lecturer then dealt with the work for the drainage of the great marsh that separated the Palatine and the Quirinal—the cloacæ or sewers, which were formed for draining the marshy ground, and also for carrying off the town sewage. Some of these sewers are still performing the functions for which they were originally executed. No doubt it was from the Etruscans that the Romans derived their skill in such work.

As to the roads of the Romans, the Roman principle was to go from point to point with as little detour as possible, and where necessary valleys were spanned with viaducts, great cuttings were formed in the rock of the hillsides, and boggy places solidified with piles; and throughout their whole length a careful foundation was formed, and the actual surface finished with great blocks of lava, irregular in form, but fitted with extreme care, some of the blocks measuring 4 ft. by 3 ft. A portion of such a paved road is still to be seen in the Forum, but in most places the paving has been carelessly relaid later. The roads were kept in careful repair, and curators of them were appointed—an office assumed even by the Emperors.

As to the great aqueducts by means of which Rome was so bountifully supplied with water from the neighbouring hills, they brought water from a great distance. In some cases, it was carried for many miles on a series of lofty stone arches. These arches supported a channel, and the water was led into reservoirs, from which the various fountains, baths, houses, &c., of the city were supplied by lead pipes, as a rule. These pipes were of sheet-lead bent round a wood core, and the edges soldered together; but they were of much heavier metal than our modern pipes. The taps and turn-cocks were of bronze, and, in cases of great pressure, the pipes also.

The lecturer then referred to the more purely architectural works of the Romans, and considered the sources from which Roman methods of building are likely to have been influenced. These, probably, were mainly two; first, the Etruscans (who influenced the Romans in the arch and in other ways), and the great influence of the Greek colonies which had been established in the southern part of Italy and Sicily, and, later, to the direct acquaintance with the best Greek work. Though the Romans departed largely from the Greek ideals, they were influenced by them greatly in the use of the Orders and in the decorative treatment of interiors. The Romans were unrivalled constructors, with a genius for dealing with new problems of planning and construction, and rendering their buildings perfectly adapted for the special use to which they were to be put, but artistically they could not be placed on so high a pedestal. Much of their detail was of high merit and great beauty, but there was a want of restraint in its application; and after the establishment of the Empire, with its luxury and wealth, architectural taste rapidly declined, and with it the technical skill of the artisan. The Romans developed an entirely new system of construction, combining strength with great rapidity of execution, which allowed of the application of the finishings of the building to the completed structure. These finishings were often of the most lavish and ornate description, but little, with the exception of the floors, was left.

The lecturer then showed lantern views of the Forum, the temples of Vespasian, Saturn, Romulus, and Antoninus and Faustina, the House of Vestals, and several other well-known buildings, which he described. By patient care and investigation the plan and many details of most of the old structures in the Forum have been recovered, and all that remains of them exposed to view. The Temple of Vespasian, though it has only three complete Corinthian columns with entablature, has the substructure nearly perfect. All the ten Corinthian columns of the Temple of Antoninus and Faustina stand, and much of their entablature, which is richly carved. Much of the walls of this temple exists, forming part of the church of San Lorenzo. The existing remains of the Temple of Castor and Pollux probably belong to a restoration at about the end of the first century A.D. Three columns of the peristyle exist, and much of the substructure. Much of the ornament, and in particular the capitals, of these temples has been greatly damaged. The great wall of the Tabularium that formed the western boundary of the Forum was the most extensive remains of Republican Rome, but little is known of its history or use. It consisted of an arcade with an attached Doric Order, and a great vaulted passage behind, and in the fifteenth century is said to have had an upper story. The three existing upper stories are modern, and much of the arcade has been filled in, only one arch being visible, and this is much restored. The small Temple of Vesta in the Forum, almost completely ruined, consisted of a circular chamber or cella, surrounded by sixteen Corinthian columns. The Temple of Romulus was almost completely preserved, but the House of the Vestal Virgins was sadly ruined. The walls for part of their height still exist, and in places even the second story exists. The structure of the Rostra still partly remains, but what is left belongs to the Rostra rebuilt on a new site by Julius Cæsar.

Amongst the most complete memorials of antiquity are the great triumphal arches, two of which stand in the Forum and one near it. The lecturer described the Arch of Titus (built to commemorate the capture of Jerusalem), the Arch of Severus (built in A.D. 203), and the Arch of Constantine (built in A.D. 312). Another form of memorial was that of the column, and some minor ones still stand in the Forum; but the most famous specimens were found beyond it. The column of Trajan was 100 Roman feet high, including the base and capital, but not the great plinth on which

it stands. The shaft is composed of twenty-one solid drums of marble, and is 12 ft. in diameter at its base, and from top to bottom a spiral stair was cut from the solid marble, while on the outside a continuous band of sculpture winds from the base to the summit. On the summit stood the colossal statue of Trajan, replaced now by that of St. Peter.

The column of Marcus Aurelius was also described by the lecturer, who then referred to the Forum of Augustus. A portion of the great circuit wall of the Forum, about 100 ft. high, still exists, and is one of the most stately ruins of Rome. On one side of an important road which ran through this Forum, stood the great temple of Mars Ultor, of which three marble columns still stand, and a portion of the cella-wall with the entablature and coffered ceiling over the peristyle. Returning to the Great Forum, Professor Elsey Smith described the basilicas that formed an important feature in its surroundings. These buildings exhibited the later methods of Roman construction, which were responsible for the preservation to our time of some of the most colossal of their achievements. It is probable that small basilicas were the first buildings, other than quite private rooms, in which Christian worship took place, and the early buildings built for Christian worship in Italy were mostly of this type—one which had an important influence in the planning of Christian churches in many lands. There were no remains of such simple buildings in the great Forum; they were replaced by vast structures. Of the great Basilica Julia there is little but the platform on which it stood, with some remains of the marble piers with attached columns that enclosed it and the row of shops with offices above, and part of a staircase leading to the upper floor, which was carried over a series of concrete vaults by the lower piers. The site of the Basilica Æmilia has quite recently been excavated, and in this case some portions of a wall and several shops or offices have been discovered, and a considerable area of paving of the richest marbles, arranged with great skill; but, as in the former case, the superstructure has perished. The great bronze gates now served as the entrance doors of St. John Lateran.

Nearly all the buildings and monuments hitherto noticed might be described as the work of the mason, built of squared stones or blocks of marble, and with columns of solid marbles, porphyrys, granites, &c., but for the vast buildings required during the days of the Empire a system allowing of more rapid construction was required, and was rapidly perfected.

The lecturer then described the Roman system of concrete construction, and gave as an illustration the Basilica of Constantine, one of the most impressive ruins in the Forum. The north aisle of the building stands nearly perfect. Fragments of the decorative features of this building are to be seen here and there, but though we can obtain some notion of the vast size and stately proportions of the building the imagination alone can supply the effect that must have been produced when it was complete, either internally, with its white marble columns (one of which now stands in the Piazza in front of S. Maria Maggiore), walls, and floors of marble and richly-modelled and painted vaults; or externally, with a casing of marble, the entrance flanked by porphyry columns and the roof glittering with bronze tiles.

The lecturer then dealt with the great public baths, the best preserved of which are those of Caracalla,* which he described in detail. The whole establishment must have been designed and worked in a scale of lavish splendour such as no other city had ever seen. The great Tepidarium of Diocletian's baths has been converted into the Church of S. M. degli Angeli, and it is practically perfect, but is not of its original height, having had the floor considerably raised. Another class of buildings constructed for the amusement of the people was the stadia or racecourse, of which there is a fine example in the Palatine. This the lecturer described and illustrated.

No building of which remains still exist in Rome was better known than the Flavian Amphitheatre, generally known as the Colosseum. It was of great size, skilfully arranged and constructed, and was, comparatively, in a good state of preservation; but no very high place could be claimed for the architectural detail. The long sweep of the cornices, the regular openings, and the splendid masonry, gave it an impressiveness that was most remarkable. In the course of a long and interesting description of the building, the lecturer said that even the London County Council could find little cause for objecting to a building so well provided with staircases and exits; though they would certainly object to the pitch of the stairs, which had 10 in. treads and 10½ in. risers. The Circus Maximus was of vastly greater size than the Colosseum, but it was wholly constructed of concrete faced with marbles, and had completely perished. More than two-thirds of the great outer wall of the Colosseum had been taken away for the sake of the stone; but enough remained even of this wall to give a fair notion of its original aspect.

The last building described by the lecturer was the Pantheon, which he said was one of the grandest and most remarkable of buildings, and which produced a deep impression on the beholder. In concluding an interesting description of the building, Professor Smith said that this great building had stood for more than eighteen centuries, and, built as a heathen temple, it had for close upon 1,300 years been consecrated as a Christian church.

On the motion of the Chairman, a hearty vote of thanks was accorded to the lecturer for his able address.

* See our issue for February 16, 1889, for an illustration.

THE ARCHITECTURAL ASSOCIATION SPRING VISITS:

II.—NATIONAL SAVINGS BANK AND POST OFFICE BUILDINGS, ADDISON-ROAD, WEST KENSINGTON.

THE second spring visit of the session was made on the 21st inst. to these buildings, designed and carried out by Mr. Henry Tanner, the Architect to the Office of Works, and which are now almost completed.

Various plans were on view, and Mr. Tanner himself most kindly met the members, and, after giving a short account of the requirements he had had to provide for, conducted the party over the works.

The main problem consisted in providing headquarters for the National Saving Bank, now located in Queen Victoria-street, in which some 3,000 men and women clerks will be employed, while arrangements had further to be made for a considerable increase of this number in the future. When it is noted that 15,000 odd ledgers are in use, some idea can be gained of the amount of clerical work which will be carried on in the building. Some provision had to be made for the public, as well as a power station for heating and lighting, a sub-district sorting and post-office, by means of which the mass of correspondence coming to the Savings Bank could be expeditiously dealt with, and also means for adequately feeding the whole of the staff employed, the men and women being separately placed and provided for.

The building is therefore an interesting example of modern industrialism, designed with due regard to economy of annual maintenance, and careful attention to the health and well-being of the servants of the nation; so that their capacity as workers may be developed to the utmost by providing healthy and cheerful offices, utilising the latest inventions for culinary purposes and not forgetting reasonable facilities for recreation.

The building is planned with two long parallel blocks 324 ft. long by 54 ft. wide, running east and west; these are connected by two shorter arms, running north and south, with corridors down their centres forming a large quadrangle in the centre and three sides of a court to the east and west. These latter will become enclosed when the extensions are carried out, and are therefore faced with white glazed bricks. At the south extremity of the site, and detached from the south wing, is placed the power station and electric plant; on the east is the post-office and sorting-room, at present a detached building, while on the west will be placed workshops and the clerk of works' department.

The main south wing is for women and the north wing for men. Stairs are conveniently arranged at each corner of the central quad, the lavatories and cloakrooms being placed in the shorter sides and lighted from the quad, while on the west and east sides respectively of these wings offices are placed, separated from the cloakrooms by the broad corridors connecting the north and south wings. In order to gain sufficient cloakroom space a mezzanine has been contrived between each main floor entered directly off the various stairs.

The most striking feature of the building is undoubtedly the generous amount of window space, the long wings being practically lighted by large windows on all four sides with the exception of the space taken up by the connecting arms. These great rooms, some of which are undivided throughout the whole length of 320 ft., are 46 ft. wide and 16 ft. high from floor to floor, with but a single range of columns down the centre, and ought to be well adapted for healthy working purposes.

The heating will be by means of radiators and low-pressure steam, or when available, the exhaust steam from the electric light installation will be used; fresh air can be admitted behind each radiator. The ventilation is by "natural" means, viz., by these inlets and open windows, while extract openings are formed in the casings of the cross girders, connected with flues running up in square projections on the external walls, and terminating in open louvred towers above the roof. Provision has been made in these for the insertion of extractor-electric fans at the roof level, should it eventually be found necessary.

The upper lights of the windows are casements made to open inwards, while the lower lights are sashes. Thus the natural ventilation of these rooms should be of the best and most effectual nature, if these windows are kept properly open.

With the exception of a few rooms devoted to heads of departments, the walls throughout internally are lined with glazed bricks of pleasing colour, which insures economy of maintenance and saving of labour in cleaning. The floors are of maple blocks laid on the concrete, the corridors being paved with Ruabon tiles.

The basement contains a printing-office and folding-room, strongroom, stores, considerable storage space for men and women's cycles, and a boy's kitchen, but the refreshment department generally is placed on the top floor. Here, in the south wing, is the women's dining-room, a large kitchen, servery, scullery, and larders, with a lift in connexion. A minor kitchen has been provided for sorters, while the men's department is similarly arranged in the north wing. Considerable interest was taken by members in these arrangements; the steam-heaters, gas-ovens, 2-in. teak sinks for crockery and galvanised iron sinks for vegetables, &c., all being carefully selected, while adequate top light and ventilation has been provided.

The roof is flat and will form an excellent promenade for the workers. Externally, a midland brick of good strength and weathering qualities, but of somewhat uninviting appearance, with Portland stone dressings are the materials employed, and the utilitarian nature of the building is clearly defined.

The constructional ironwork has been carried out by Messrs. Dorman & Long. Messrs. Kirk & Randall being the contractors.

A vote of thanks to Mr. Tanner for his kindness and trouble concluded an instructive visit.

THE LONDON MASTER BUILDERS' ASSOCIATION.

ON Thursday evening last week members and guests of the London Master Builders' Association dined in "The Empire Hall" of the Trocadero Restaurant, Piccadilly-circus, W., Mr. G. J. Lough, President, in the chair. The company included the following gentlemen:—Mr. Arthur Vernon, President of the Surveyors' Institution; Mr. H. T. Hare, President of the Architectural Association; Mr. W. F. King, President of the Institute of Builders; Mr. W. F. Wallis, President of Southern Counties Federation of Master Builders; Mr. C. H. Barnsley, President of the Midland Federation of Master Builders; Mr. J. Dewrance, President of London Association of Engineering Employers; Mr. W. E. Riley, Architect to the London County Council; Mr. Walter Smith, Master of the Carpenters' Company; Colonel G. H. Trollope, V.D.; and Messrs. J. Brown, J.P.; E. J. Brown; J. Carmichael; S. Collins, L.C.C.; F. J. Dove; T. Gregory; F. May; R. Sawyer; Silvanus Trevail; C. C. Trollope; C. Wall; E. White, L.C.C.; F. H. A. Hardcastle; J. W. Lorden; S. B. Depree, and others.

The loyal and patriotic toasts having been

honoured (Mr. Silvanus Trevail proposing the "Imperial Forces," and Col. G. Haward Trollope responding),

Mr. J. Brown proposed "The London Master Builders' Association and its President." He said that while the Association included so many able men in its ranks it would be able to carry on the excellent work it had done in the past. London was being absolutely rebuilt, and from one end to the other its architectural works were being greatly improved. But building work had now to be carried out as quickly as possible, for we were not like the monks of old, who took their time at their building work, and who not only prepared beautiful plans and drawings but also models in order to see how the work would look when carried out; and he suggested that more of this might be done in these days. Nowadays it was not so much the value of the building put up that was considered, as the value of the ground on which it was built, and speed, therefore, and mechanical aids had become a necessity; and it was surprising that work was done so well in the circumstances, and that it lasted so long. The Association was young in years, but it had accomplished a great deal. It began at a time of trouble between masters and men, and it had accomplished so much that now masters and men were able to meet at a conciliation board and discuss and often settle their differences without striking. This had been done, too, in spite of great opposition. Men and masters understand each other better to-day than they did. As an old builder he felt sorry when the old personal friendship between master and man passed away, and men were paid and discharged by the hour; but they had to face the conditions as they are and be just and true, both to the men and the clients. The hardest battle of life was with oneself, and he begged of them to be loyal to each other, and to make up their minds what was right, irrespective of persons or things. In that way they would win the confidence of all men.

The Chairman, in response, said the Association was having its first year's experience of the new rule as to subscriptions, which had been passed in order that the Association might get a reserve fund for use in case of need. That rule was for members to pay so much on the 100*l.* paid in wages, and this year the money had been collected, and he thought they might congratulate themselves on the way in which the members had paid up their largely increased subscriptions. There had been only one little difficulty, and that was this: for some reason or other a good many builders objected to sending in their return of wages. As Mr. Carmichael said last year, if builders had been asked for a return of the amount of profits, their reluctance could be understood. Still, after a good many applications, returns had now been received from practically all the members, and the consequence was that the Association is, financially, in a position it had never been in before. They had paid all their debts, they had money in the bank and money invested. The rule was first adopted for one year only, but at the last general meeting it was adopted permanently, and they were collecting the subscriptions now without the trouble of last year. There were still some builders in London who are not members of the Association, and that ought not to be so, for all the master builders of London ought to be united, and he hoped that those who are not members would join. It had been a source of gratification to him as President of the Association to preside at the meetings of the Conciliation Board, for friction and strikes had been avoided as a result of those meetings. The Board had not always been able to come to decisions equally agreeable to masters and men, but they had given their decisions honestly and fearlessly on the facts as stated by both sides. The men's representatives had met the masters and had listened to their side of the question in a very fair, just, and respectful way, and had not acted, as in years gone by, in any dictatorial way. The men's representatives had not always carried their point, and they saw the justice of the masters' contentions. With trades unions as trades unions masters had no quarrel. Those unions were started with the laudable object of improving the status and condition of the men; and really the masters' associations were for the same purpose. There was no reason for quarrelling with the men's unions, unless they went beyond their proper province and dictated to the employer how he should carry on his business. As to limiting the output, if the men did so it was an economical mistake. The dearer workmen made their work the less work people would have done. There was one little grievance he had against some of the workmen's unions, and it was this: they were in the habit of making rules of their own, and then trying to read them into the rules of the Masters' Association. For instance, at the Conciliation Board the other day the carpenters raised the question of piecework, and said that one member of the Association was working piecework, which was contrary to the rules. But the Association had no such rule, and they did not object to piecework; in fact, some of the members wished they could have a little more of it, and he did not think some of the men would object to that, for then some of them would be able to earn three or four pounds per week instead of being tied down to the union rate of pay for what was called a skilled workman. The Association had lost by death during the year Colonel S. Harrison and also Mr. Walter Spencer, who was a good friend of the Association. In conclusion, the Chairman said that the thanks of the Association were due to their energetic and painstaking secretary, Mr. Costigan.

Mr. W. F. Wallis then proposed "The National Federation of Master Builders of Great Britain and Ireland." In the course of his remarks he said that the Federation had been in existence twenty-five years, and its income now is seven times as great as it was in 1891. He saw no reason why the Federation should not have a house of its own a permanent secretary, and give benefits to its members. Why should not the Builders' Mutual Insurance be incorporated with the Federation? and why should it not insure all the builders of the United Kingdom and give them the benefit of accident insurance? In addition, why should they not found a good war fund and give members legal advice and assistance in strikes? If this were done, the Federation would be more useful than ever. Strikes were getting out of favour with the unions, and rightly so, for the recent legal decisions had given them cause to think. At the same time it must not be forgotten that the men intended to make strenuous efforts to recover lost ground by means of fresh legislation, and the Federation must take the most efficient steps to stop that.

Mr. C. H. Barnsley, in response, said there were 11,000 firms engaged in the building trade in the country, to say nothing of the allied trades, and to attempt to federate them was a bold venture, seeing how the trade is scattered over a wide area, and what a diversity of custom there is, and what a difference as to rules. Then there was the prejudice and indifference of the masters themselves, for there were retrograde and stationary as well as progressive builders; but the greatest difficulty in regard to the federation of the master builders of the country was the selfishness of many. These men were not ready to join or influence the movement, but they were quite ready to accept its benefits. That was one of the difficulties to overcome, and he was glad to say that the Federation had made progress, and it was on a sound financial basis. The Federation must be united to be strong; the strength of the men was their compact unity.

Mr. W. F. King then proposed the toast of "The Architects and Surveyors." There was a freshness and vigour about the architecture of the present day which not only gave pleasure, but also hope for a still more brilliant future for architecture. He recently had occasion, as President of the Institute of Builders, to meet the Council of the Royal Institute of British Architects, and he had been much struck with their courtesy and kindness, and their liberal and impartial views on matters which might be in contention between themselves and the builders. Builders generally had the highest opinion of the impartiality of architects, and in proof of this he might say that a builder, in the event of a dispute with an architect, was always ready to submit the question in dispute to another architect, knowing that he would receive impartial and fair treatment. As to surveyors, the quantity surveyor was a modern creation, and builders would not like to be without them at the present day.

Mr. H. T. Hare, who responded for the architects, said that architects and builders must work together, for one was complementary to the other. As to unions, this was an age of combinations, and for men of any calling to make progress they must combine. Any combination of employers which had as an object increasing efficiency and the carrying on of work without friction must have the sympathy of all architects. The Architectural Association, over which he had the honour of presiding, existed mainly for the education of the rising generation of architects, and he was quite sure it was to the interest of the architectural profession and of builders that architects should be thoroughly qualified to carry out their work; and unless they were qualified, it was to the detriment of the public as well as of architects and builders. He supposed that no meeting of architects and builders could properly be "rounded off" without some reference to the question of conditions of contract. The question had been under discussion for many years, and it had often been said that the new conditions were on the point of being settled, but they were not arranged yet. It was highly desirable that there should be a standard form of contract acceptable to both architects and builders, and he believed that at the present moment this was nearer of accomplishment than it had ever been before. The points in dispute had been narrowed down to very small limits, and he had good reason for believing that the whole document was absolutely on the point of being accepted. All that architects desired—and he was sure it was all that builders desired—was that the document should be a fair one between the contracting parties; one side did not want to have any advantage over the other. His experience was that it did not matter what the conditions of contract were provided the two sides were fair and honest, and only wanted what was due to them; but he was afraid that there were some cases in which either one party or the other wanted more than it was entitled to, and that was the root of all the mischief. As to limiting the output and the reducing of the efficiency of the workman, he hoped the Association would fight against it to the utmost. He could not help thinking that one of the results of the negotiations between the masters and the men would be a return to something in the nature of piecework. Piecework was what a good many builders objected to and fought against, but he could not see that, in principle, there was anything wrong in it. Every contract was piecework, and he could not see why the principle should not be carried to its logical conclusion.

Mr. Arthur Vernon, who responded for the surveyors, said there was something charming in the title "Master Builders." By that builders meant that they were masters of their trade; that they meant to be masters of their men; and architects and surveyors knew that they were masters of the situation. Architects and surveyors loved the honest, straightforward builder, who gave the best of work, the least trouble, and the most satisfaction. A firm of builders had worked for him for twenty years, and he had occasion to find fault with something the other day. The builders replied, in a phrase which should indicate the general relationship between the architect and the builder:—"We cannot let you complain," and they did the work over again. The Surveyors' Institution had a membership of nearly 4,000, and it included the best practitioners in the United Kingdom.

Mr. J. W. Lorden submitted the toast of "Representatives of Public Bodies and Visitors."

Mr. E. D. White, L.C.C., replied. For a long time the County Council assumed a hostile attitude to builders, and imposed conditions of contract which builders resented, refusing to tender. So the County Council, alleging that a ring had been formed against them, started a Works Department, which had been a heavy and egregious failure. 75,000*l.* of the ratepayers' money had been squandered, and if the accounts were made up to date he believed the loss on the Works Department of the London County Council would come out far above 100,000*l.* The facts were being kept back as long as possible, in the hope that some job would come in to improve the result. One grievance which builders had against the London County Council is about to be removed, viz., that the rule of the Council retaining the priced bills of quantities sent in by tenderers will be altered. In future, shortly, those bills of quantities will be returned.

The proceedings then ended.

THE LONDON COUNTY COUNCIL.

THE usual weekly meeting of the London County Council was held on Tuesday in the County Hall, Spring-gardens, Sir J. McDougall, Chairman, presiding.

Loans.—On the recommendation of the Finance Committee, it was agreed to lend Southwark Borough Council 7,750*l.* for contribution to housing scheme; Stepney Borough Council 1,500*l.* for contribution towards purchase of Ford and Sidney Squares; Woolwich Guardians 1,000*l.* for poor-law purposes; St. George-in-the-East Guardians 3,850*l.*, and West London District School Managers 1,800*l.* for the same purposes. Sanction was also given to the borrowing of 3,600*l.* by Lambeth Borough Council for paving works, and to 895*l.* by Islington Borough Council for electric light installation.

The King and Workmen's Cupboards.—The Chairman said he had received a letter from the King's private secretary in reference to the recent visit of the King and Queen to the artisans' dwellings at Millbank. The following is part of the letter:—

"Their Majesties were greatly interested by everything that they saw, and his Majesty especially so, from the fact that he was a member, and most constant in his attendance at the meetings, of the Royal Commission on the housing of the working classes.

Both sanitation and comfort appear to the King and Queen to be well cared for in these houses, and the only suggestion which they would offer is that the inmates should be provided with a larger number of cupboards. This might seem a small matter, but they would be a great convenience, and would also prove of considerable advantage, inasmuch as they would help to prevent a 'litter' in the rooms, and would thus add to their tidiness."

Accidents to Workmen.—The following recommendations of the Works Committee were agreed to:—

"That the arrangement made by the Works Committee for the commutation, on payment by the Council of 200*l.*, with 3*l.* 3s. costs, of the allowance of 14s. 7d. a week made to George White, labourer, under the provisions of the Workmen's Compensation Act, 1897, be confirmed.

That the arrangements made by the Works Committee for the commutation, on payment by the Council of 225*l*, with 3*l.* 3s. costs, of the allowance of 17s. 9d. a week made to W. J. Mears, bricklayer, under the provisions of the Workmen's Compensation Act, 1897, be confirmed."

Tramways.—The following recommendations of the Highways Committee were agreed to:—

"(*a*) That the supplemental estimate of 10,500*l.* submitted by the Finance Committee be approved; and that the expenditure of that amount on capital account be authorised in connexion with the road-work and platelaying portion of the reconstruction of the Tooting to Westminster, &c., section of the London County Council Tramways.

(*b*) That the sum of 8,230*l.* be added to the amount of the contract entered into with Messrs. J. G. White & Co., Ltd., in pursuance of the resolution of the Council of November 5, 1901.

(*c*) That the sum of 2,085*l.* be added to the amount of the contract entered into with Messrs. Walter Scott, Ltd., under the resolution of the Council of November 5, 1901.

That the estimate of 32,000*l.* submitted by the Finance Committee be approved; and that the expenditure on capital account be authorised of sums not exceeding that amount in all, in respect of the rebuilding of a portion of the existing car-sheds and the erection of workshops at the Council's tramways depot at Camberwell, in connexion with the reconstruction, for electrical traction, of the London County Council tramways.

That the offer of Messrs. Dick, Kerr, & Co. to supply twenty additional double-decked single-truck, electrically-equipped cars for the sum of 11,200*l.* be accepted."

Atmosphere of the "Tubes."—Discussion was resumed on the Report of the Public Health Committee, a portion of which consisted of reports made by the Council's chemist and Dr. Andrewes on the atmosphere of the tube and underground railways. The Committee recommended that copies of the reports by the Council's chemist and Dr. Andrewes be sent to the Central London Railway Company, in compliance with their request.

Mr. Beachcroft moved as an amendment to refer the matter to the Committee to consider whether the reports of the Committee could not be printed for sale.

The amendment was accepted by the Chairman of the Committee, and was agreed to.

Opposition to Bills.—The Council agreed that petitions should be presented in opposition to the Crystal Palace District Gas Bill, the Gas Light and Coke Company's Bill, and the Thames Conservancy Bill.

Widening of Hampstead-road.—Considerable debate arose upon the question of the widening of Hampstead-road between Euston-road and Tolmer's-square, owing to the complication of the matter with the question of the construction of a tramway from the present terminus in Hampstead-road to a point near Oxford-street. The Borough Council of St. Pancras desire the County Council to widen Hampstead-road, but are opposed to the tramway scheme, while the Highways Committee agree as to the importance of the street widening, but wish the Borough Council to consent, as a condition, to the introduction of a Bill to authorise the County Council to construct the tramway along Tottenham Court-road. The matter came before the Council upon a Report of the Improvements Committee, who made a recommendation in favour of the widening of the street at an estimated gross cost of 245,000*l.* (226,500*l.* net). There was also a special Report of the Highways Committee upon this matter, proposing to amend the recommendation of the Improvements Committee by making the expenditure conditional upon the action of the Borough Council as above stated.

Mr. McKinnon Wood moved that the Report of the Improvements Committee be referred back, as this was not a convenient time for adding to the Council's capital liabilities.

Mr. Cleland seconded the amendment.

In the end, the amendment to refer the Report of the Improvements Committee back was carried by sixty to thirty-two.

The Fire at Colney Hatch Asylum.—The Asylums Committee submitted a long report as to the recent lamentable fire at Colney Hatch Asylum. In the course of their remarks the Committee reported as follows:—

"We have referred previously in this report to the fact that the asylums which came into the possession of the London County Council at the time of the transfer of county property only afforded accommodation for 71·9 per cent. of the total number of lunatics for whom the county had to provide accommodation. On January 1, 1890, there were 10,104 patients for whom accommodation had to be found for the county. On January 1, this year, there were 16,961 patients, showing an average annual increase for thirteen years of 527. Starting with a great deficiency, and having a very large annual increase to contend with, it is some satisfaction to record that on January 1 this year there was sufficient accommodation to house 97·4 per cent. of the total number of the county's certified lunatics. In a period of thirteen years the deficiency in accommodation has been reduced from 28·1 to 2·6 per cent. The expenditure of the Council (including liabilities) in providing new asylum accommodation for the last thirteen years, amounts to 1,925,000*l.*: this figure does not include the alterations to Hanwell asylum, costing 66,840*l.*, and improvements and additions at other asylums which amount to many thousands of pounds. The number of beds provided by the Asylums Committee since 1890 in permanent and temporary buildings, with the dates of the opening of the asylums, are shown in the following table:—

Permanent Buildings.

Asylum.	Number of beds.	Opened.
Cane Hill (additions) ...	876	March, 1892.
Claybury	2,158	May, 1893.
Banstead (additions) ...	102	June, 1894.
Heath Asylum, Bexley	2,098	September, 1898.
Hanwell (alterations)...	150	March, 1902.
Horton	2,000	March, 1902.
Epileptic colony ...	300	—
	7,684	

Temporary Buildings.

Colney Hatch... ...	300	May, 1896.
Banstead	300	June, 1896.
Hanwell	400	March, 1898.
Manor...	700	June, 1899.
	1,700	

With regard to other temporary accommodation we may here state that the temporary buildings of the Manor Asylum and the Hanwell annexe were constructed with plastered interiors on steel lathing. The annexe for males at Banstead, though match-boarded, is not of the same design as the buildings which were destroyed at Colney Hatch. We have, however, thought it desirable to make certain alterations in the corridors which will minimise the danger in the event of an outbreak of fire. We are also with the same object and with the knowledge and concurrence of the Commissioners in Lunacy, having alterations carried out at the Manor Asylum and Hanwell temporary buildings. We hope, as soon as possible, to report to the Council as to further asylum accommodation now necessary, and the manner in which we think it should be provided."

Mr. Hubbard, Chairman of the Committee, replying to a few remarks and suggestions, said it was very well to be wise after the event. Before this catastrophe no one had any idea that a fire could get hold of the buildings in the way that had occurred; someone had been constantly on the watch in the dormitory, and there had been a hose with a good flow of water obtainable by the mere turning of a wheel. Nor was it thought, with the exits there were, that if a fire occurred the patients could not be removed—it was believed that they could be got out in two minutes. The insurance companies did not regard such buildings as liable to a terrible risk, or they would not have taken the insurance at half a crown per cent., which was the highest rate the committee paid, another place being insured at the ordinary rate. After this bitter experience of the corridor acting as a funnel, the committee had lost no time in removing the wood and the felt from the corridor at Banstead, and they proposed to lay a concrete floor. At Hanwell they had a subway, and were breaking up the corridor into sections. The committee realised the risk of the temporary buildings, but they could not remove the 1,400 remaining patients at once; they were, however, anxious to put all the patients into permanent buildings at the earliest possible date. They had tested the water supply at each of their asylums, and it was very good. It had been said that the doors ought to open outwards; they did open outwards.

Dust and the Demolition of Buildings.—The Local Government and Taxation Committee reported as follows, the recommendation being agreed to:—

"The Conference on Streets and Street Traffic held in 1900 expressed the opinion that when buildings are being demolished in streets, the owner or contractor should be compelled to prevent annoyance as far as possible by sprinkling water and by the erection of screens made of reed, straw, or other suitable material. The Council on February 19, 1901, referred this resolution to us, with a view to our framing a by-law to give effect thereto. We accordingly prepared a by-law which we thought would meet the case, and, in accordance with our usual practice, submitted it in draft to the Home Secretary for his observations. The Home Secretary states that he feels doubtful whether there is such a general nuisance as to justify a by-law, and inquires what evidence there is of the existence of a nuisance not covered by Section 121 of the Metropolis Management Act, 1855, which requires the erection of a hoarding in cases in which the footway is obstructed or rendered inconvenient by the demolition of a building. He also expresses doubt whether the proposed by-law would remedy the evil in question, and in other ways adversely criticises it. Having regard to the views of the Home Secretary and to the fact that the nuisance in question is to some extent dealt with under an existing statute, we are not at present prepared to recommend the Council to take action in the matter, and we therefore recommend—That the reference to the Local Government and Taxation Committee on February 19, 1901, with regard to the demolition of buildings, be discharged."

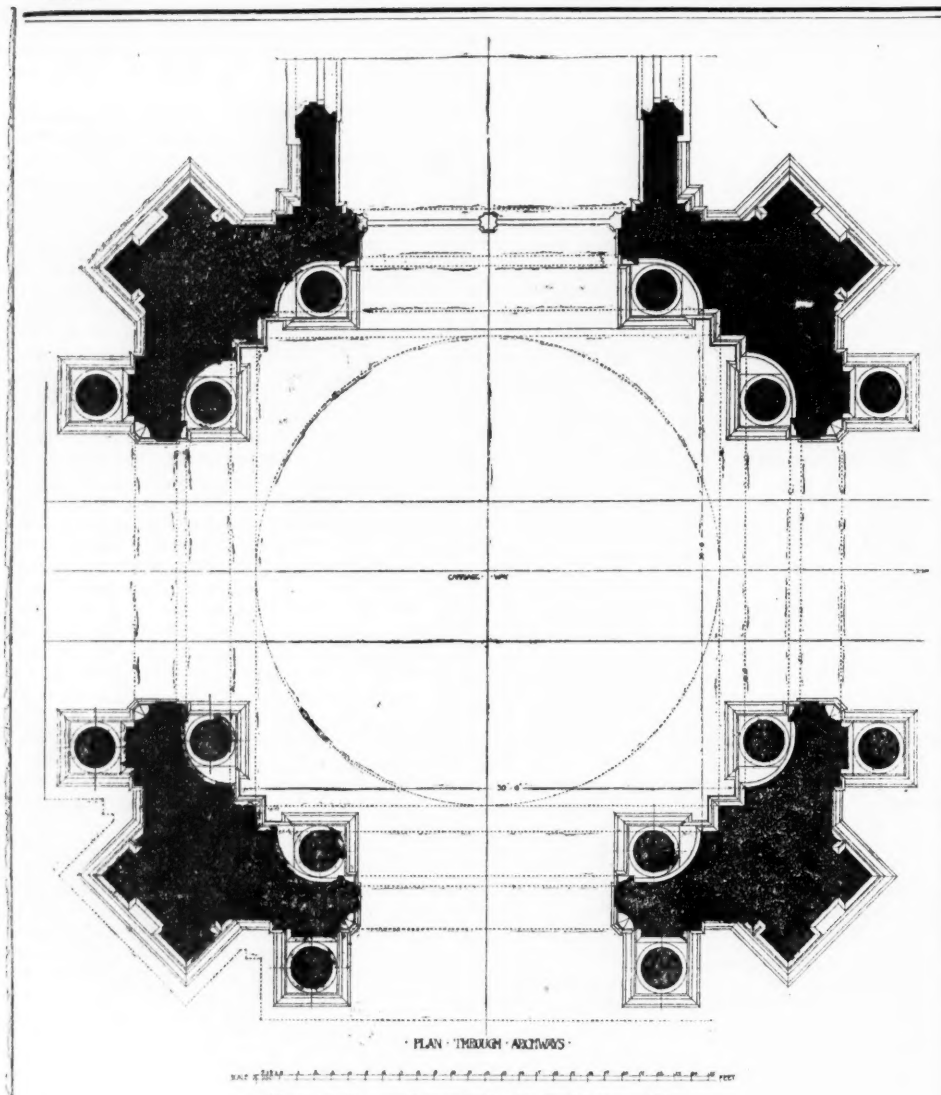
Southern Outfall Sewer Enlargement: Greenwich-road Branch.—It was decided to construct the Greenwich-road branch of the proposed new outfall sewer from Crossness to Deptford without the intervention of a contractor. The amount of the estimate is 17,500*l.*

The Council adjourned soon after seven o'clock.

COMPETITIONS.

SCHOOL PREMISES, MOORFIELDS, ST. GEORGE, BRISTOL.—The first premiated design in this competition was that sent in by Messrs. La Trobe & Weston, Clare-street, Bristol. The building is for 400 junior mixed scholars. Nineteen designs were submitted.

PROPOSED BUILDING INSPECTOR FOR ABERDEEN.—On the 19th inst., at a meeting of the Plant Committee of the Aberdeen Town Council, the question of the appointment of a Building Inspector, to act under the jurisdiction of the Corporation, came up on a remit from the Council. The general feeling was that an inspector should be appointed, but meantime it was resolved to remit to the Burgh Surveyor to inquire as to the nature of the duties of similar officials in other towns, to define the qualifications necessary for such a post, and to report generally as to the desirability or otherwise of an inspector.



Design for a Domed Porte-Cochère. Plan.

Illustrations.

DESIGN FOR A DOMED PORTE-COCHÈRE.

WE give this week the design by Mr. J. B. Fulton for a domed porte-cochère to a public building, for which the Grissell medal was awarded this year by the Council of the Institute of Architects.

The Grissell medal, as most of our readers are aware, was founded for the encouragement of drawings of practical construction, design in the artistic sense being a secondary consideration. The nature of the subject given this year, however, almost necessitated the prominence of the element of architectural design; and indeed in some of the sets of drawings submitted design, in the popular sense of the word, seemed to have been considered almost to the exclusion of constructional detail. Mr. Fulton, however, has produced a design in which fine architectural quality is combined with a most complete and conscientious study of the putting together and jointing of the stone-work, and it was, perhaps, the only one in which design and construction were treated entirely on an equality.

Mr. Fulton has sketched in the sculptural decoration with his usual ability, but we may suggest that it is hardly wise to employ figure sculpture on three different scales in the same building, unless the smaller sculptures are so decidedly framed off from the general architectural design as to become a separate element—as, for instance, in the frieze of the Parthenon. In Mr. Fulton's design the figures between the columns and those on the consoles are in exactly the same relation to the architecture, and therefore suggest two different scales. This should be avoided in combining sculpture with architecture.

ALDERSHOT COUNCIL OFFICES, FIRE STATION, AND TOWN HALL.

EARLY last year the Urban District Council of Aldershot invited architects to submit competitive designs for these buildings, with the result that twenty-six designs were submitted, the accompanying design under the motto "Nemo" being awarded first premium by the assessor, Mr. Frank T. Baggallay. The author of the design is Mr. C. E. Hutchinson, who has been appointed by the Council to carry out the erection of the Council offices and fire-station, it having been decided to postpone the building of the town hall until a future date.

The Council have applied to the Local Government Board for sanction to borrow 9,000*l.* to cover the cost of erection of the buildings, and an inquiry was held by Major J. Stewart, R.E., on January 28, when no opposition was offered to the scheme.

The design had to be arranged so that the front elevation of the buildings should be complete, and that when the Council eventually decide to erect the town hall no addition or alteration shall be necessary to the main front. The town hall was therefore placed behind the Council Offices block, with corridor connecting same with entrance hall of offices.

It is proposed to use Monks Park stone for dressings and Blue Forest of Dean for the plinths to main front. Red brick and coloured cement work will also be introduced in the elevations, and the roofs are to be covered with green "Eureka" or Welsh slates.

The estimated cost is about 8,300*l.*

SOME FURNITURE FROM THE ARTS AND CRAFTS EXHIBITION.

WE give illustrations from photographs specially taken for us (by permission of the exhibitors) of five examples of furniture at the Arts and Crafts Exhibition.

No. 1 is an oak sideboard by Mr. Sidney H. Barnsley, exhibited in Recess 6 in the North Gallery.

No. 2 is another oak sideboard of somewhat more elaborate nature, which stands in the centre of the end wall of the North Gallery, and was specially referred to in one of our articles on the exhibition. It is designed by Mr. Ernest W. Gimson, and executed by Mr. P. Waals.

No. 3 shows a chest of drawers by Mr. Ernest Barnsley, and a small cabinet by Mr. Sidney Barnsley.

No. 4 is a small oak sideboard, exhibited in Recess 7 in the North Gallery, designed by Mr. W. Curtis Green and made by Mr. A. Romney Green and Mr. D. Dilliway. It was referred to and described in our general review of the exhibition.

No. 5 is a very interesting letter cabinet, No. 292 in the catalogue, exhibited in the South Gallery; it is designed by Mr. E. W. Gimson and made by Mr. P. Waals. The circular panel in the half-opened door contains a decorative treatment of a peacock, with expanded tail filling the circle.

THE SURVEYORS' INSTITUTION:

REGULATIONS FOR PROTECTION FROM FIRE.

AN ordinary general meeting of the Surveyors' Institution was held on Monday evening at No. 12, Great George-street, S.W., Mr. Arthur Vernon, President, in the chair.

The minutes of last meeting having been read and confirmed,

Mr. Penfold, Hon. Secretary, announced some donations to the library and the library fund, and a vote of thanks was passed to the donors.

Mr. Henry Lovegrove then read a paper entitled "Regulations for Protection from Fire." The following is a short summary of the principal points in the paper: Introductions, Acts and By-laws; Notes on the London Building Act, 1894; Notes on the L.C.C. Regulations for Theatres and other places of public resort; Regulations under the Factory Act; General Remarks on Construction to prevent Loss of Life by Fire; Suggestions for new Legislation; Comments on the London Building Act Amendment Bill, 1903, and Views of Property Owners and the City Corporation. As to the regulations for the construction of theatres, &c., he said, speaking generally, they left nothing to be desired, and it might be hoped that their adoption would prevent any very serious loss of life in connexion with fire or panic in a London theatre. The very excellent regulations under the Factory and Workshops Act, 1901, should be embodied in the proposed Building Acts Amendment Act. The whole of the Sections were excellent, and everything possible had been done to prevent loss of life in case of fire or panic. In all cases of construction designed to save life the most important consideration was to have floors, passages, and staircases sufficiently fire-resisting to enable the inmates to escape with ease and safety through wide staircases and spacious exits, as suffocation by smoke was the real danger, risk of death by fire being of secondary importance. As to the clause that all windows above the ground floor, facing the public way, must be made to open easily at sill level to a sufficient height and width to allow a full-grown person to pass through in case of need, nothing could be worse than the common practice of using in factories iron casements with one small portion, often near the top of the window, hung on centres for ventilation; in such buildings escape by the windows in case of fire would be impossible. It was to be hoped that the regulations now in force would prevent the use as factories of ordinary buildings, often crowded with workers, two or more buildings being sometimes thrown into one, and in some instances all the staircases but one being removed or blocked up. A case came under his notice of a fire which might have had disastrous consequences if the structure had been burnt down in the day during working hours instead of in the night. In this building the workers had to go the whole length of a long building to descend the stairs, and then the length of the next floor to reach the main staircase. Fortunately the existing rules provide not only a direct exit of fire-resisting construction, but more than one such exit. Take the case of an ordinary building of the warehouse class, with proper walls and party walls, with a roof of incombustible materials in strict accordance with all the requirements in force. The front was on what might be called the pier and lintel system, with very large openings, and piers of the minimum dimensions. In a fire the iron or steel lintels buckled, and the piers cracked. This sometimes occurred in both back and front walls. The back wall was usually carried on girders supported by iron columns or stanchions entirely unprotected, and in some cases, if the materials stored on

the lower floors were very inflammable, the columns bent or broke during the fire, and the building collapsed. Behind this back wall there was an area from 10 ft. to 20 ft. deep, covered with a glazed lean-to, through which the fire ascended and the burning timbers from above fell. The glazed area was often adjacent to two or more similar areas, and so the fire spread. The roof was often largely formed of glazed skylights, and the lift formed a convenient shaft to carry the fire up the building. Given these conditions, and each floor crammed with, say, furniture or other inflammable goods, and it could not be surprising that very extensive fires occur, causing great destruction of buildings and stock. It was impossible to widen the streets in the centres of business life, or to control the conduct of business, and it had been shown how a building, in strict accordance with all existing regulations, might yet be a structure which would be easily and quickly destroyed should any portion ignite. Fire-resisting floors must have been in use on the Continent for many years, as they are found in buildings of from thirty to forty years old, and it was strange that in this country more buildings for business purposes, such as factories, stores, and warehouses, were not constructed with floors formed of steel joists filled in solid with coke-breeze concrete. Floor boards could be nailed down upon the concrete and the under side rendered. The thickness was less (so that there was a saving in height) and the cost was no more than that of the usual fir joists, with often a match-boarded ceiling, which was soon destroyed in a very ordinary fire. If these fir joists were pugged with coke breeze and cement concrete, they would offer some resistance. Then, again, how much valuable property would be saved if roofs were of fire-resisting material, or were protected by some such material. He inspected, not very long since, a floor of concrete beneath which a furious fire had raged with very little damage except the melting of the asphalt finish. In all cases the girders and supports must be protected, or the whole would collapse, as was the case with a fireproof floor in one of the great fires in Tabernacle-street, Finsbury. Nothing could be worse than the lining of walls with matchboarding, as in such a case the fire rapidly spreads over the rooms adjacent, and was easily and quickly conveyed to the floor above. The regulations of the London County Council as to escape from roofs over 60 ft. above the pavement were good, but if not complied with by the construction of a staircase to a fireproof flat or landing, other means, such as iron steps and ladders, would be of very little use in case of fire. In the daylight a man in his ordinary clothing could ascend and descend with ease, and the whole thing appeared to be delightfully simple; but change the scene to a dark night, with rain or snow, and suddenly awakened and scantily clothed girls, women, or old people attempting to climb or descend an iron ladder! In any case the treads of the iron steps or ladder should be flat, and not, as is sometimes the case, ordinary iron bars.

Until the passing of the London Building Act, 1894, churches and many other buildings were allowed to be constructed as veritable death-traps. Churches and chapels (to consider that class of building for the moment) were frequently, previous to the date named, provided with only two doors, often rather narrow and opening inwards. It must have occurred to many taking part in the service in a crowded church, where perhaps even the passages were filled with forms and chairs, to wonder what would happen in the event of a fire or a panic; as, if the doors did get closed in the struggle, the narrow exits would soon be blocked with corpses. Quite as dangerous, on a smaller scale, were the various public rooms and schoolrooms used for parochial entertainments. There was no kind of system in the arrangement of seats, which were often partly forms and partly chairs. If the entertainment was popular, the place was crowded at the back and sides with persons standing, and one thought with horror of the two doors opening inwards. At bazaars, and often in parochial rooms, some performance of a theatrical nature took place, and the lighting of the stage, whether by gas or candles, was often a source of danger, being generally improperly fixed and insufficiently protected. Every precaution should be taken to avoid the presence of unnecessary articles of an inflammable nature in the entertainments referred to, and the legal regulations must be carried out so as to insure that the building was fire-resisting, in order that the fire might be held in check while the persons assembled could escape through ample exits instead of being suffocated and eventually burnt.

As to theatres, a well-devised plan by which during panic the audience might find an easy exit from any part of the house was of more importance than the consideration of the methods of fire-resisting construction. The architect must, in the first place, consider ample and direct means of exit, and when these points have been secured then fireproof construction and appliances for the extinction of fire might be considered. Before considering the building itself, a suitable site must be secured, with at least two sides fronting streets. If possible, the exits should be at the end of the theatre opposite to the stage, where the fire generally originates, there being a tendency for the audience to rush in the opposite direction on an alarm of fire being given. Some of the best authorities on theatre planning considered that the dress-circle should be nearly on the same level as the street, so that, in the event of panic, the people from the crowded pit would run less risk in ascending stairs than in descending, while the lower position of the ground floor or pit would enable the upper floor to be only a very short distance above the street level. Here the regulation as to height, on the stage side of the proscenium wall, was good, as the smoke would ascend from the stage and pass through the lantern, instead of ascending to the roof of the auditorium and suffocating the unfortunate individuals in the gallery, as was the case at the Exeter theatre fire.

Fire-resisting floors were generally considered to be the most important factor in preventing a spread of fire, and the best floor was that which combined conditions likely to produce satisfactory results with great lightness. Very many of the patent floors in the market were so heavy as to require a great increase in the strength of walls and other supports. Every system for use in the future must, without doubt, include complete protection of all ironwork. The patent systems were many, one of the best consisting of tubular terra-cotta lintels arranged diagonally, their own diagonals being at right angles to the line of joists, so that the lower flanges of the joists were completely covered by the lintel; other floors were constructed of solid concrete, the lower flanges of the joists being covered with terra-cotta. There was also a floor of steel decking with concrete filling, and some years since a well-known firm introduced a special kind of concrete of gypsum, said to be thoroughly fire-resisting. Whatever might be the form of the floor used, the girders carrying the floor and stancheons or columns supporting the same must be encased. For this purpose the iron or steel might be covered with expanded metal and plastered. Many writers spoke highly of the use of a floor made of solid wood beams or joists placed close together. An experiment was made in London not long since with a floor composed of beams 12 in. by 9 in., laid so that the thickness was 9 in. After a most severe test of fierce fire for an hour at 2,000 deg. Fahr., the fire was extinguished by water, and the wood was found to be charred 1½ in. to 2½ in. deep. Another experiment was made on a floor of wood joists filled in with concrete, constructed with 9 in. by 3 in. fir joists placed 16½ in. centre to centre, and the concrete—composed of 1 part of Portland cement to 6 parts of coke breeze, properly mixed, and allowed ample time to set. After being exposed for half an hour to 800 deg., it was exposed for one hour to 2,500 deg., followed by a stream of water. Five hours afterwards the floor collapsed, the joists having been burnt from 2 in. to 6 in. deep. Some experiments were made with the ordinary form of iron door, which remained in position, but became red hot, buckled, and warped, as did the frame. One upper corner bent over. Another door of wood covered with tinned steel plates was much buckled and bulged, the upper part bending inwards, and admitting the flames, in one-fourth of the time taken to render the iron door useless.

In any amendment of the London Building Act, it should be made compulsory to remove and clear away every temporary wood or iron building, except fowl-houses and similar buildings not exceeding 6 ft. in height, as in many districts in London the gardens were so covered with shanties of various kinds that if a fire occurred it would spread to an alarming extent. All such existing buildings should be removed within six months after the passing of the Act. Section 84 of the London Building Act should be amended so as very clearly to define the wooden buildings to be licensed. The transfer of the powers under this section from the London Council to the Borough Councils was one of the most foolish things ever done by the legislature, for unless the Borough Councils were very careful, a portion of the Building Act would be a dead letter. Section 74 of the London Building Act should be altered so as to include public-houses and beer-shops, and the nature of the enclosures to the passages and staircases should be clearly defined, and the decision of the magistrate at the Clerkenwell Police-court, confirmed by the Court of Appeal, should be entirely swept away; but the requirements should be confined to new buildings, *i.e.*, such re-erections as were so defined under the Building Act.

The London Building Acts Amendment Act, 1903, is divided into four parts. "Section 5 gives definitions of 'owner' and 'high building,' which latter means a building of which the upper surface of a floor or story is more than 50 ft. above the footway or ground adjoining. Section 6 requires that means of escape shall be provided from new buildings after the passing of the Act. Under Section 8, any alteration in the accommodation on the upper stories must be approved by the Council. All appliances and means of escape must be kept in good condition to the satisfaction of the Council. Section 9 deals with the construction of internal staircases. It would be possible so to alter this section as to state exactly how such staircases should be constructed, and thus avoid the delay necessary in obtaining the special approval of the Council, and greatly to decrease the work of the Committee and officials. Section 10 requires that, after January 1, 1905, owners of existing high buildings must present plans and descriptions of means of escape, and the approval of the Council must be obtained. Instead of going to arbitration in case of difference (Section 10 [5]) the matter could very well be referred to the existing Tribunal of Appeal, which does not get sufficient work. Copies of all plans and schemes approved by the Council should be sent by the Council to the district surveyor, as by Section 82 (5) of the London Building Act. By Section 11, after January 1, 1908, all existing buildings are placed on the same footing as new buildings, thus allowing three years for owners to make the required alterations. Section 12 applies to all buildings not occupied by one family, in which more than thirty persons sleep or are employed, and it would be well to insert a clause exempting public buildings. Section 13 provides for an order of the Petty Sessional Court prohibiting the use of certain portions of buildings. Section 14 requires the Council to keep register of orders made under the last section, but it is difficult to understand the necessity for the words after 'reasonable times.' The section as it stands might work against the intention of the Council in case of accidental omission. Section 15 is not clear, and the procedure under the Dangerous Structure Sections of the London Building Act would be found to work better. Section 17 (1) appears to require the alteration of a few words in places. In Sub-section 6, it might be better to settle the width of the passage as 3 ft., as the 6 in. more or less can make very little difference. Sub-section 8 provides for an additional staircase if the frontage of the building exceeds 40 ft., and it might be better to fix the area at twenty squares, otherwise a very large building with a narrow frontage would be very inadequately provided with staircases. Sub-section 10 provides for pugging between joists, which is nearly certain to produce dry rot. Section 18 is excellent, and a necessary requirement, but here again one width for the passage would be better. Section 20 relates to the construction of lifts and their enclosures. The roof over the lift might have a glass lantern and ventilator to allow smoke to escape. Sections 21 and 28, both inclusive, refer to notices, and legal penalties, not of much interest, and not admitting of much discussion.

The First Schedule describes the method of arbitration, which may prove elaborate and expensive. If it is finally approved, the District Surveyor could act as arbitrator for the Council,

but it would probably be better to refer each case to the Tribunal of Appeal. This, of course, is a legal question, not of much interest to the general public. The Second Schedule refers to the fees of district surveyors under the Act, and, when the matter is explained, the Council may be relied on to see that the fees are adequate, having regard to the responsibility and work involved. The laudable intention of the Bill is to provide proper protection for the public, but care must be taken not to press too heavily or the result may be migration of factories, &c., from the county of London, and consequent loss of rates."

Directly the Bill was proposed, the City of London took an adverse view of it, and would probably try to obtain an entire exemption from its principal clauses. There was no portion of London where the risks were greater, as the buildings were crowded on every available foot of ground, and were often crowded with workers whose only means of escape in case of fire would be by a narrow staircase. Some of the factory and warehouse buildings, both in the City and adjacent, had many partitions with doors opening inwards, adding to the difficulty of escaping in haste from a burning building. The erection of new buildings in accordance with the Bill would not present such serious difficulties as were likely to arise under the retrospective clauses, which would, without doubt, seriously affect the interests of property owners, mortgagees, and others.

It must be admitted that, as experience had proved, many City buildings offer very little resistance to the flames, while their position in crowded streets and courts rendered them veritable death traps. It would, therefore, be better for the City carefully to consider the provisions of the Bill, and, if possible, to get some of the more drastic ones modified, thus avoiding what the City Fathers most dread—a great expense to owners, a disastrous effect upon trade, and the driving from the City of many traders, with the result of a serious decrease in the rateable value of property. In many cases a large outlay would be required for new stairs, &c., and unless the tenant could be made to pay more rent the loss must fall on the owner or mortgagee, while if they refused to carry out the requirements of the County Council the upper floors, more than 50 ft. above the pavement, would remain empty, and a still greater loss be thereby sustained. He was sure that a staircase of the usual type required by the Factory Act was most beneficial, as so many of the other escapes to roofs and flats would be of very little use. He would suggest a strict regulation requiring shavings and rubbish to be frequently removed, and gluepots and stoves used only on a proper hearth. He had discovered stoves standing on a tray on a boarded floor, the surrounding floor being several inches deep in shavings, while each of the alien workmen was smoking a cigarette. The clauses of the Bill were being carefully considered by the district surveyors of London, whose opinions, the result of practical experience, would, he was sure, be courteously received by the London County Council, and as many as possible of the suggestions adopted.

Mr. Alexander Payne, in proposing a vote of thanks to the lecturer, said he very much agreed with Mr. Lovegrove's remarks. As to the Building Act of 1894, he never could understand why its retrograde provisions, in some respects, had been agreed to. By the Act of 1855 all door and window frames on the exterior face of a building had to be kept back in reveal, and the obvious reason for that was in order to keep wood from the face of the building; also to prevent these frames when burning from falling into the street. In addition to that, barge boards and wood for gables were not permitted. Unfortunately, at the time of the discussion on the Bill of 1894, some architects were attracted by the fashion of 150 years previously, and they wanted to do away with those restrictions, and as a result of their representations those requirements were abolished. He had seen a big fire in a factory where the flames extending across the road were prevented from spreading as there was nothing to ignite in the houses opposite, all the wood being kept in reveals; and the old restrictions, in his opinion, ought certainly to be maintained in the case of buildings in streets, though they were not so important in the suburbs and in buildings standing back some distance from the street. This was an important point, as also was that of party walls. A very strong attempt was made at the time of the passing of the 1894 Act by some architects to get rid of party walls. It was said that party walls did not look well in long rows of buildings, projecting above the roof; but, fortunately, the evidence of fire brigade officers was so strong as to the immense utility of the party walls above the roof that the Committee said they dare not make any alteration; and so party walls were retained in the 1894 Act. But the modern system of building was resulting in great measure in the abolition of party walls. It used to be the fashion in the suburbs to build rows of small houses with a party wall between each of them, and rarely did a fire which might occur in a house extend beyond the small building in which it took place; but now, owing to the increasing custom of erecting buildings in flats, containing sometimes practically a dozen houses in one, if a fire broke out in such a building it would probably gut the whole place. In the new Bill there will probably be legislation on this point; these buildings in flats should have proper fireproof exits and should be limited in size by party walls. In some cases in these flats there were shops below and dwellings above, and as the danger from fire in shops—in some shops especially—was greater than in dwellings, some legislation seemed necessary in that respect. The shops should be entirely distinct from the dwellings, with proper party walls, and each shop should be distinct from others. Mr Lovegrove had given a useful abstract of the regulations with regard to theatres and factories. He did not propose to make comment on these. The regulations had worked very well, and he did not think new legislation was proposed as to theatres or factories; but there was one other point in the paper on which he would like to make special remark. The most retrograde step in modern legislation had been the transference of the powers of the London County Council as to wooden structures to the Borough Councils. It was a mistake to have two authorities dealing with the same matter, for it led to irritation and litigation. It had been decided in the law courts that the Borough Councils were the licensing authorities as to wooden structures, while the District Surveyors saw to the carrying out of the licence. But the Borough Councils would not inform the District Surveyors when they had licensed a building, so that a District Surveyor might take legal action, and then find that a licence to erect had been granted by the Borough Council. It was intended that licences should be granted for buildings which did not come under the Act, but the Surveyors to the Borough Councils were under the impression in some cases that they could license any building, such as a church or a house, in wood if they pleased, which would of course render all the precautions against fire in the Building Act entirely nugatory, but he did not think that there would be anything but muddle until wooden structures were put back under the authority of the London County Council. He knew of the following case, which showed the danger: Some one went to the County Council for a licence to erect a wooden building covered with corrugated iron, but the Council did not think the building a proper one to grant a licence for. The applicant then went to the Borough Council, taking off the corrugated iron, and got his licence. We knew from the Colney Hatch disaster what a great danger there was from these buildings, and, if such things as he had described could be done, legislation seemed useless. As to the proposed amendments to the Building Act, the owners of property were up in arms, and there would be great difficulties in getting the Bill agreed to; but the same difficulties had to be faced in regard to theatres and factories. To prevent and stop fires was an economical thing for owners of property, and it ought to be done; and he hoped that a good and useful Bill would be introduced and carried, and that the owners of property, instead of entirely opposing it, would co-operate with the public officials in carrying out an object which, if well done, would be beneficial to all.

Mr. C. Forster Hayward, F.S.A., in seconding the vote of thanks, said he agreed with Mr. Lovegrove in most of his remarks, and went beyond him in thinking that legislation might be carried very much further in some directions. He was glad that the County Council had introduced their Bill as to the *means of escape from fire* and the *reduction of risk* from fire. The loss of life and property from fire recently had been so appalling as a result of the absence of certain precautions which might very well be taken that fresh legislation was needed, and legislation of a most drastic kind. Even the new proposals did not provide for fireproofing iron columns supporting buildings, and he might say that he had got people to go beyond the Act and do so, though even then there were difficulties. For instance, only that day he passed a place where iron columns were protected with wire put round them; but he found that the wire was nailed to wood blocks placed between the flanges! If some knock were given to the columns during a fire, and the flames were to get to the wood, the "protected" column would be sure to go. There was no provision in the Act as to protecting iron work from fire and that was needed. Another matter about which he felt strongly was as to the construction of staircases. According to Section 68 of the Act, staircases of large buildings had to be fire-resisting and "supported or carried by fire-resisting supports." That provision ought to be very widely extended—to almost every staircase which was made of fire-resisting materials such as stone or concrete. The matter had engaged his attention a great deal, for he had seen cases in which the stone staircase had fallen and crushed down under a very slight outbreak of fire and where wooden staircases would not, probably have been destroyed. In a building in Woburn-place there was an ordinary stone staircase, apparently as good as thousands of others, supported by being built into the wall on one side. A fire occurred (which had a fatal result), and the staircase crushed down in a heap. He afterwards found that all had broken except the few steps which were supported by an ordinary 2-in. framing which filled in the spandrels between them and the stairs which went down to the kitchen or cellar in the ordinary way, so that the stairs were saved which were supported on the 2-in. wooden support; and the stone steps, which were exposed only to a slight licking fire, crushed down. From that he deduced the theory that the outer string of every stone staircase ought to be supported in some way or other, and that no stone or concrete stairs ought to be allowed without supports to the outer string. He had been able to get that done in many cases, but unless the authorities had backed him it would not have been possible to enforce his views. He wished those views could be embodied in the new Act, which he hoped would result in some good legislation for the prevention of fire and the saving of life.

Mr. J. Douglass Mathews said he was rather sorry, seeing the attempts there were to prevent loss of life from fire, that the new Bill had not gone a little further and dealt not only with high buildings and places occupied by more than thirty people, but with the ordinary dwelling house, which must need protection as much as other buildings. For a comparatively small outlay, the staircase in an ordinary house might be shut off from the other part of the house. Instead of the thin timber used in staircases of ordinary houses, it might be made thicker so as to resist fire.

Mr. A. R. Stenning said he did not agree with Mr. Lovegrove that it was only in the 1894 Act that there was any idea of prevention of fire in buildings, for the Act of 1855 started with that idea in the preamble and heading of the Act. A great many clauses of that Act were very good, and had worked very well. The present crisis or scare was owing to the fire in Queen Victoria-street, and the County Council were frightened because they had not got their fire brigade, and other arrangements for putting out fire, in a better state, and the Bill they had prepared went too far, and he was doubtful about some of its clauses. He was a member of a Committee of that Institution, which was trying to find out whether they could make any practical suggestions with a view of improving the bill, but that was a matter he was not in a position to discuss then. He might say that he thought the County Council might have waited a little longer before introducing their Bill, and might have relied more on the powers they already possess under the Factory Act of 1901. As to Mr. Payne's point about the sash frames, he (the speaker) never knew of a fire occurring in the manner suggested, and he did not think the amount of wood in a sash frame, when on the external part of the brickwork, was sufficient to

cause a spread of fire from a building on the opposite side of the street. As to fires in flats, he had had a great deal to do with such buildings, and he might say (and this was also the statement of Sir Richard Farrant, who had had so much experience in regard to this class of building) that the fires which had occurred in these buildings had been very few; and, remembering how little furniture and combustible material there was in the rooms of these buildings, he did not think, where the buildings were properly constructed of concrete and iron joists, that sufficient heat could be generated in any one room to cause a fire to extend beyond that room. He had a little experience himself in Scotland a few years ago in a large hotel. A fire occurred in the middle of the night in one of the rooms on the second floor, some material in the room having caught fire, but the fire was confined to that one room, although the floor, which was burnt through, was of wood, and though the building was badly constructed. There was, as a rule, not sufficient combustible material in such buildings to cause a big fire, though that was not so in an ordinary house which was constructed with wood joists. If the present Building Act were carried out judiciously, there was no need to enforce upon unwilling lessees and owners of property the absurd requirements of the London County Council, and the proposed Bill would be unnecessary. A fire was a very alarming thing, and it was desirable to protect those who had to work in buildings where escapes were not provided, and it was difficult in London to provide all the means of escape that were possible. He thought that surveyors and others should do all they could to advise their clients not to turn their buildings into some other purpose than that for which they were erected, and if that practice could be stopped a good many fires would be prevented. He endorsed what Mr. Payne said about party-walls stopping the spread of fire, but in the country they were glad to stop a party-wall from coming through the roof and so spoiling the appearance of buildings. But fires seldom spread from house to house—a house might be gutted but, as a rule, the fire did not extend.

Mr. Thomas Blashill said he was sure the proposed Bill would be received by members of that Institution with respect, and that they would, while opposing some of its provisions, do all they could to improve it. Surveyors must not put themselves in the position of property owners, who did not want to spend money, but they must take a calm and impartial view of matters. As to what had been said about panic legislation, none of the recent great fires taught us anything that we did not know before. If one set fire to combustible materials, the fire would burn, and burn quickly, and as to the "marvellous" way in which, according to some newspaper reports, fires spread, there was nothing at all marvellous about it. Such fires as the Paris Bazaar fire and the Colney Hatch fire taught the practical man nothing, but they taught something to people who did not think. If one set fire to a wooden building, it was on fire all over at once—that was a necessary consequence, and there was nothing marvellous about it. What practical people had to do was to see that provision was made to get people out of burning buildings as quickly as possible when a fire occurred. He did not agree with Mr. Lovegrove as to pugging. Pugging a floor was a very ordinary operation, and if damp pugging was used dry rot would occur, but if the pugging was allowed to dry there would be no dry rot. He had had much to do with artisans' dwellings, and there was not one built for the London County Council but what had steel and concrete floors, which were not more expensive than properly constructed wooden floors. He quite agreed as to the rarity of fire spreading in small flats from one tenement to another, and the trouble was not about such buildings, but rather factories, warehouses, theatres, churches even, where people were cooped up with no means of escape whatever. Surveyors were really most interested in regard to retrospective legislation. He could not see how the enforcement of rules as to protection from fire in new buildings could be justified if old and dangerous buildings were to be exempt. Legislation affecting these old buildings must come sooner or later: whether there should be three or five years' grace he did not care to argue, but exemption should not go on indefinitely. As to fireproof construction, there were many fireproof materials brought out every year, and he did not see why we should not make use of them. That class of material known as asbestos, or asbestic, or uralite was not used half as much as it ought to be, and he hoped that greater use would be made of them. Door and window frames set out in the front of brickwork had been found from experience to be exceedingly dangerous. As to what Mr. Stenning had said about the absurd regulations of the London County Council, those regulations were largely founded upon the reports made from time to time by the chief officers of the Fire Brigade as the result of their knowledge and wide experience, and it did not do to say that a requirement was absurd when we had had no experience of its necessity. As to the hope expressed that clients and owners might be got to take more care in the management of their premises, he had had so much experience on that head that he knew it was hopeless to expect anything of the kind. Over and over again he had seen ample stone staircases in warehouses in the City filled up by boxes and cases stacked against the wall so that there was not room for two people to pass against the banister, and when the occupier's attention was drawn to this, he remarked that there was not going to be a fire. That was the general view: "they knew it would not happen." The same remarks applied to theatres more or less. One of the greatest difficulties in years gone by was to get the doors of theatres opening outwards provided with self-acting bolts—panic bolts; and there was one theatre where a foremost theatre architect introduced panic-bolts amongst other up-to-date requirements. The client, however, said he would not have them unless he also had the means of locking the doors, which, he said, could be unlocked immediately before a performance took place. The Board thought they had no power to object to that, and permission was given. He (the speaker), feeling rather anxious about the matter, went to the theatre one evening at nine o'clock during a performance, and found, as he expected, that all the doors were locked. He went into the box-office, where the clerk said, in response to his remarks, "Oh, yes, it's all right, I have the key in my pocket, and I shall unlock the doors five minutes before the end." Things were very much altered now, and the Council would not have locks. That showed that occupiers could not be relied on. He had found the cellar under the stage of three or four theatres packed by scenery up to the joists under the stage; he had found a chained dog in a panic exit, bicycles at another, and in another two beer casks which entirely blocked the exit.

A member said he did not agree with what had been said against the transference of powers as to wooden structures to Borough Councils; in most cases Borough Councils took a common-sense view of things, and, what was more, no one was better able to judge of local requirement than the Local Authorities. The mistake was in not transferring the whole of the responsibility as to wooden structures to these bodies.

Mr. E. Dru Drury said that Hankey's mansions were constructed under the 1855 Act, and the floors were of concrete and steel joists, and on one occasion there was a fire in one of the flats which burnt itself out without extending. There was also a fire at the Welsbach Incandescent factory, where there was a lot of inflammable material, but divided into sections shut off by iron doors. The fire broke out in the middle of the day, when 125 girls were at work, but the forewoman promptly closed the iron doors and the girls got away through the three or four separate exits without difficulty. The London Building Act and the Factory Acts, judging from those examples, seemed to fulfil their objects very well. Professional men ought not to find much fault with the new Bill. There was one very wise provision, *i.e.*, that lifts should be enclosed; for lifts were often funnels for conveying fire from one floor to another. Some such Bill as that proposed was sure to be passed sooner or later, and they should do their best to make it workable.

After a few remarks from Mr. A. King, the vote of thanks was passed, and Mr. Lovegrove briefly replied.

The Chairman announced that the next meeting will be held on March 9, when Sir John Barton, C.B., will read a paper on "The Early History of Irish Valuation."

The meeting then terminated.

ARCHITECTURAL SOCIETIES.

ARCHITECTURAL ASSOCIATION OF IRELAND.—The sixth annual dinner under the auspices of the Architectural Association of Ireland was held on the 19th inst. at the Dolphin Hotel. The President, Mr. F. G. Hicks, occupied the chair. After dinner the President gave the toast of "The Architectural Association of Ireland." He said they had been established some seven or eight years, and this was their sixth annual dinner. He thought they were doing a rather good work in a quiet way by their meetings and classes. Their membership was increasing every year. They now numbered 150. During the present session they had approached the Royal Institute of Architects of Ireland with a view to initiating examinations for admission to their body. The matter was still under consideration. The Institute had taken up the matter favourably, but great bodies moved slowly, and they could not, of course, expect for an answer until some further time had elapsed. Still, the Association intended to keep hammering away, and if the Institute did not grant their request they would probably hold an examination of their own. The toast was cordially honoured. The President next gave the toast of "The Guests," which he coupled with the names of Mr. Purser, President of the Junior Engineering and Scientific Society, and Mr. Crawford Smith, both of whom replied.

ARCHÆOLOGICAL SOCIETIES.

BRITISH ARCHÆOLOGICAL ASSOCIATION.—A meeting was held on Wednesday evening, the 18th inst., Dr. W. de Gray Birch, F.S.A., hon. treasurer, in the chair. Mr. T. E. Price Stretche exhibited a curious example of a horse's bit which was recently dug out of the moat surrounding an old manor house in Shropshire. The bit probably is of the early fourteenth century. Mr. Patrick exhibited on behalf of Mr. Richardson a fire mark, of the date 1807, of the Royal Exchange Assurance Co. It is of cast lead, and bears a good impression of the building which was the immediate predecessor of the existing Royal Exchange, and was destroyed by fire in 1838. This fire mark was taken from one of several old cottages of late seventeenth century date at Strand-on-the-Green, Chiswick. These cottages once formed a portion of the City Barge Inn, and portions of the old City Corporation barge were used in the construction of the inn. Mr. Percy Scott exhibited a collection of Greek and Roman antiquities of bronze, a male and female figure, two fibula, a key, a nail-shaped symbol, highly ornamented with lines and cross patterns, a ring, a "boar-pig" finger ring engraved with a horse leaping up towards an altar or canistrum. With reference to these bronzes, especially the male and female figures, the Rev. H. J. D. Astley remarked "that they bore a great resemblance to similar articles found at Troy, Tirgns, and Mycenæ. They belong to the prehistoric or Mycenian portion of the Bronze Age, and may be compared with products of Etruscan art." Mr. Andrew Oliver gave some "Short Notes on Some Churches in France," descriptive of a large series of fine photographs which were hung on the screens. About midway between Chartres and Le Mans is La Ferte Bernard with a grand church of the fifteenth and sixteenth centuries. The interior terminates in an apse without a triforium, the space which would be occupied by it being filled in with panelled work. Upon the caps of the columns round the apse are statues under canopies. The exterior shows two distinct dates in the work, the parapet consisting of an inscription in large letters. Close to the south porch there is a curious representation of Julius Cæsar and Cleopatra looking out of a window, occupying the blank space over the arch of the window. About ten miles from Nevers are the remains of the monastery of La Charité sur Loire. Upon the site of five bays of the north aisle modern houses have been erected within the walls, the vaulting shafts are to be seen on the outside. The great tower is a grand piece of early twelfth-century date, 1107. The whole building, with the exception of the arches in the choir, shows rounded arches, which is somewhat unusual at so late a period. Of the original structure there alone remains the tower (already mentioned), about three bays of the nave, chancel, and transepts. There are some mutilated remains of the dormitory and refectory, the former now used as a stable, the

latter as a warehouse, while other portions are incorporated in the municipal buildings. Another church has been turned into low-class dwellings. At Soissons, the remains of the once great Abbeys of S. Jean des Vigores and S. Marie des Vigores, the former possessing a magnificent triple-arched front, flanked by a tower and spire on either side, and portions of the cloisters are still in existence. The refectory and dormitory are now used as a depot for military stores. Of S. Marie hardly anything is left, but, like S. Jean, the remains are in the hands of the military authorities. Mr. Gould, Mr. Baxter, Mr. Compton, Mr. Williams, Mr. Rayson, Mr. Cheney, the Rev. H. J. D. Astley, and Mr. Patrick took part in an interesting discussion following the paper.

ENGINEERING SOCIETIES.

THE JUNIOR INSTITUTION OF ENGINEERS.—On the 21st inst. a party of about 100 members of this Institution visited the East Greenwich works of the South Metropolitan Gas Company through facilities extended by the Chairman, Sir George Livesey. They were shown over by Mr. Joseph Tysoe, and Mr. W. G. Wernham expressed the thanks of the party for the arrangements made for their benefit. The Company owns some 130 acres of land at Greenwich Marshes, having a frontage of 1,400 yards on the river Thames. About 100 acres of this land are reserved for gas-making purposes, upon which area it is intended to arrange twelve retort houses. Four retort houses, 485 ft. long, running parallel with the river, are now completed, and a fifth is being built. Each house is equal to a make of about 6,000,000 cubic feet per day, and contains forty-five settings, of ten retorts in a setting. Each retort house has separate connexions, condenser, exhauster, washer, scrubbers, and purifiers, with one extra set of exhausters for three retort-houses. In No. 1 retort-house the Foulis-Arrol hydraulic stoking machines are used. In Nos. 2, 3, and 4 houses West's stoking machines are employed. They are worked by the wire-rope system, driven by gas engines. The coal jetty is built L-shaped, and works are at present in progress to convert it into a T-shape for increasing the coal unloading facilities. At present four hydraulic cranes are fixed for unloading only one ship at a time. The jetty is in communication with the coal stores between each retort-house, by means of an elevated railway. A ship of about 1,250 tons is discharged in about 7½ hours. The gas is condensed in pipes running round the retort-house, and afterwards in a 36-in. spiral pipe condenser. It then travels through a water condenser, so arranged that the gas passes backwards and forwards through the gas passages, while the water runs from bay to bay in the opposite direction. Compound condensing engines of the "Farey" type are connected direct to pairs of 140,000 cubic feet per hour exhausters. There are six of these sets—one set for each retort house, with two spare sets for the four houses. A new engine-house is in progress of construction. The gas passes through three "Livesey" washers, supplied with ammoniacal liquor from the hydraulic mains and scrubbers, and thence to the scrubbers; the second and final one are supplied with water, which is afterwards pumped over and over in the first or liquor scrubber. There are six purifiers — four charged with lime, and two with oxide. The lime purifiers are worked in rotation. The station meters will pass 156,000 cubic feet per hour, two being required for each retort house. The drums work in concrete tanks sunk in the ground, so saving the expense of a meter house. The first gasholder erected is in four lifts, varying from 241 ft. to 252 ft. in diameter, and 44 ft. deep, with a capacity of 8 million cubic feet. The second gasholder built was made larger, but as the water in the ground was the cause of adding so considerably to the cost of the work, it was decided to excavate to a depth of 13 ft. only, and carrying the concrete tank 20 ft. above the ground level. As the diameter of the outer holder is 300 ft. and the depth only 31 ft. 6 in., the holder would be difficult to guide on rising, if special care had not been taken in the arrangement of rollers for the inner lift. There are six lifts, two of which rise above the framing. The capacity of this holder is 12,000,000 cubic ft. A considerable portion of the gas made at these works is sent up daily to the Old Kent-road works through four miles of 48 in. main. Centrifugal fans are used for handling the gas as well as for distribution. New chemical plant has been erected for the manufacture of sulphate of ammonia and the necessary sulphuric acid. One unit of ammonia plant is completed, which is capable of turning out 20 tons to 25 tons of salt per diem. Spent oxide of iron is used for acid making, the material being burnt on shelves, and the resulting sulphurous acid oxidised to sulphuric acid in the usual manner. Each unit is capable of making about 14 tons per diem.

BUILDERS' CLERKS' BENEVOLENT INSTITUTION.

AT the thirty-sixth annual general meeting of this Institution, held at 21, New Bridge-street, E.C., on the 24th inst.—the President, Mr. Fredk. Lionel Dove, in the chair—the report and balance-sheet for the past year were presented, approved, and adopted, and officers were elected for the present year.

The report showed that the income for the year had been 756*l.* 13s. 11d.; 606*l.* had been paid in pensions, the largest amount yet disbursed in that direction by the Institution; and 15*l.* had been paid as temporary relief grants. In addition, three builders' clerks' orphans are still being maintained and educated in the Orphan Working School, Haverstock Hill, N.W., per the presentations purchased by the Institution.

The Chairman, in moving the adoption and printing of the Report and Balance-sheet, said he should be glad to hear of an increase in the number of annual subscribers. The affairs were admirably worked, and a great deal of benefit dealt out to those who were so sadly in need.

Mr. H. W. Parker seconded the motion, which was carried unanimously.

It was announced that Mr. Deputy Greenwood has kindly accepted the office of President for the coming year, and Mr. Dove proposed his election as President, and remarked that as a well-known City business man and a member of the Corporation, he was eminently fitted to occupy the position in question.

Mr. Turpin seconded, and it was carried unanimously.

The Hon. Treasurer, Mr. Edwin Brooks, was re-elected, also the following gentlemen as committeemen:—Messrs. Desch, Dutch, Parker, Pitts, Stansfeld, and Turpin. The honorary auditors were also re-elected.

A vote of thanks was accorded Mr. Dove for his services during his year of office.

Mr. Dove, in reply, said the committee were excellent colleagues to work with, and he could not finish without congratulating the committee on having in Mr. J. Austin such an able secretary.

APPLICATIONS UNDER THE LONDON BUILDING ACT, 1894.

THE London County Council at their meeting on Tuesday dealt with the following applications under the London Building Act, 1894. The names of applicants are given between parentheses:—

Formation of Streets on the Sanders Estate on the South-East side of Coldharbour-lane.

Norwood.—That the resolution reported to the Council on January 20, 1903, in regard to the application of Messrs. R. Ellis & Son, for sanction to the formation of five new streets on the Sanders estate on the south-east side of Coldharbour-lane, Brixton, be modified so as not to require the applicants to form the temporary streets, except in connexion with, and as part of, the permanent roads intended to be formed.—Agreed.

Proposed Erection of One-Story Shops, Mare-street, Hackney.

Hackney, Central.—One-story shops upon part of the forecourts of Nos. 263, 265, 267, and 269, Mare-street, Hackney (Messrs. Hodson & Whitehead for Mr. H. W. Rowlandson).—Refused.

Erection of Houses, Brockley-rise.

Lewisham.—(*a*) That the resolution of the Council of October 7, 1902, consenting to the erection of seventeen two-story dwelling-houses with bay windows, on the west side of Brockley-rise, northward of Honor Oak Park, be rescinded. (*b*) Erection of seventeen two-story dwelling-houses with bay windows on the west side of Brockley-rise, northward of Honor Oak Park (Mr. A H. Kersey for Mr. R. Kersey).—Consent.

Lines of Frontage and Projections.

City.—A stone balcony at the fourth floor level of proposed premises for the Clerical, Medical, and General Life Assurance Society, No. 1, King William-street, City (Messrs. Dunn & Watson).—Consent.

Norwood.—That the application of Mr. P. L. Waterhouse for an extension of the period within which the erection of an addition at the Norwood Technical Institute, Knight's Hill-road, West Norwood, to abut upon Chapel-road, was required to be commenced, be granted.—Agreed.

Hackney, Central.—A block of buildings on the site of No. 222, Mare-street, Hackney, to abut upon Darnley road (Messrs. Holman & Goodrham for the Royal London Friendly Society).—Refused.

Width of Way.

Islington, West.—A dwelling-house on the east side of Adam's-place, George's-road, Holloway (Mr. W. Goring).—Refused.

Width of Way, Line of Frontage, and Projections.

Westminster.—Two three-story projecting windows in front of a building on the site of No. 83, Vincent-square, Westminster (Mr. E. J. Stubbs for Messrs. T. Millman & Co.)—Consent.

Hackney, Central †—The re-building of No. 46, Morning-lane, Hackney, abutting upon Fox's-lane (Messrs. Still, Wheat, & Luker for Mr. J. Ward)—Consent.

Width of Way and Height of Buildings.

Kensington, South.—A fire-brigade station on the north side of Clarence-mews, High-street, Kensington (Mr. O. Fleming for the Fire Brigade Committee of the Council).—Consent.

Space at Rear.

Kensington, South.—A modification of the provisions of Section 41 with regard to open spaces about buildings, so far as relate to the proposed erection of a block of residential flats on a site on the southern side of Brompton-road and eastern side of New-street, Kensington, with an irregular open space at the rear (Mr. C. W. Stephens for Messrs. Stuttaford & Co., Ltd.).—Consent.

Lewisham.—A modification of the provisions of Section 41 with regard to open spaces about buildings, so far as relate to the proposed erection of seventeen houses on the west side of Brockley-rise, Brockley, with irregular open spaces at the rear (Mr. A. H. Kersey).—Consent.

Means of Escape at the Top of High Buildings.

St. George, Hanover Square.—A deviation from the plans approved in respect of the means of escape in case of fire, proposed to be provided in pursuance of section 63 of the Act, at a block of residential flats and No. 10 (now known as No. 7), Park-lane, St. George, Hanover-square, so far as relates to the omission of doors shutting off the corridors on the top floor from the main staircase, and the erection of a 2 in. deal glazed partition, with an opening fitted with self-closing doors, shutting off that floor from such staircase (Messrs. Rolfe & Matthews).—Consent.

Dwelling-houses on Low-lying Land.

Peckham.—Twelve buildings on low-lying land situated at Nos. 650 to 674, Old Kent-road (Messrs. Holman and Goodrham, for the Royal London Friendly Society)—Consent.

Greenwich.—Houses and shops on low-lying land situated at Blackwall-lane, East Greenwich (Mr. E. Lister).—Consent.

*** *The recommendation marked* † *is contrary to the views of the Local Authority.*

MANCHESTER CITY COUNCIL AND THE FAIR CONTRACTS CLAUSE.

AT an adjourned meeting of Manchester City Council on the 18th inst., the Town Clerk said correspondence had been published in regard to the fair contracts clause, and he had that morning received a letter from the secretary of the Manchester and Salford Trades Council expressing the hope that the Council would reject a motion which appeared on the agenda in the name of Mr. T. C. Abbott. Mr. Abbott's motion was as follows:—"That, having regard to the serious objection made to the form of contract required by the Corporation of this city, it is expedient that a full consideration be given to its provisions, with the object of securing, if possible, an arrangement that shall be acceptable to all concerned. That for this purpose a special Committee be and is hereby appointed with power to act. The Committee shall include Aldermen Hoy, Vaudrey, Southern, and Harwood, and Councillors Arrandale, Sutton, Heenan, Smethurst, and Brocklehurst." In moving it, Mr. Abbott said that not only the Watch Committee, but other committees as well, had felt a difficulty in connexion with the new clause. His motion did not in any way deal with the principle involved in the Standing Order and Clause 4 of that order. It had nothing to do with the question whether or not it was a just and a fair clause. It was simply a question of the Council facing a difficulty that had

arisen—a difficulty technical, financial, and it might be, legal—in regard to the interpretation of the clause which had been drafted and accepted by the Council on November 9 last. Matters of considerable importance depended on the interpretation of the clause. Only one side had been heard in the discussion, and therefore he thought they were justified in giving the parties who had already stated their objection to the clause an opportunity of submitting their views to the consideration of a committee.—Mr. Alderman Rawson seconded the resolution. Mr. Hart proposed to add after the words "with power to act" the words "and at the same time to consider and report upon the desirability of establishing a works committee." This, he said, would extend the scope of the consideration of the committee beyond that of a mere examination of the phraseology of the fair contracts clause. The master builders might be quite right in challenging the phraseology of the clause, but their action would afford the opportunity for interminable discussion. Why had they not given the clause a twelve months' trial? All that was in the minds of trade unionists was that people taking contracts from the Corporation should submit to the recognised conditions of work. That was all that was wanted. The master builders said they could not follow everybody with whom they had to deal, and see that their work was done under fair conditions. In reply, he could say that the Council never had the slightest idea of asking them to do any such thing. The London County Council, he would point out, had a far more drastic clause than the Manchester one. The London Council had established a Works Committee, and had put an end to trouble by doing work for themselves under proper superintendence.—The Town Clerk said the amendment of Mr. Hart was one of which notice must be given.—Mr. Brocklehurst suggested that the proposed committee should consider "other steps" for overcoming difficulties. Mr. A. H. Scott hoped the proposed committee would be considerably enlarged and report on the question of the Council doing its own work, as Mr. Hart had suggested. As a member of the Watch Committee, he was struck with the unanimous decision arrived at by the local contractors in the tenders with regard to certain work required at the new fire station. If they were going to allow these contractors to see that the work of the Corporation could be set back by them, not once but many times, then it became time that the Council should consider the other alternative—that the Corporation should carry out its own work. The Rivers Committee were carrying out the whole of their work by men in their own employ, and the Tramways Committee had never regretted the stand they took in carrying out their own work in placing the overhead wire equipment. The contract the Watch Committee had to let was for the foundations of the new fire station, and the wisest course for the Committee to have adopted would have been to do the work themselves. If they had carried out a policy of that sort they would once and for all have done with this interference by a combination against resolutions approved by the Council. Mr. Sutton said the master builders ought to have given the clause a year's trial. The Council ought not to consent, two months after passing a resolution, to see themselves dictated to in this way in regard to the matter. The resolution affected some 60,000 working men in Manchester, and if they multiplied that number by five, it was going to affect the happiness and the wages of 300,000 working people. He urged that the existing clause should be given a twelvemonths' trial. Mr. Brocklehurst moved as an amendment that after the words "acceptable to all concerned" should be inserted the words, "and, at the same time, to consider and report as to the advisableness of taking such further steps as, in their opinion, are required to avoid the recurrence of the difficulties which have now arisen." Mr. Abbott accepted the amendment as part of the resolution. Sir J. Harwood said it had been stated that wages were different in different towns. That was so. A plasterer might earn, say, 8d. an hour. In Liverpool the rate would be 7½d. But a contractor sending a man out from Manchester to Liverpool would pay the man not the Liverpool but the Manchester price. He thought there had been no need to raise this question last November. The old clause, which he himself had the chief part in drafting, had worked very well. There had been no serious breach of good faith. Of course it did not work absolutely well, simply fairly well; and it was not wise to change that which had acted fairly well. There were always some people who tried to obtain labour at less than its just reward, and there always would be. He hoped the Council would go back to what it did before. Mr. Boyle said that the Tramways Committee had had their own difficulties with contractors, some of whom tried by subterfuges to get behind the clause originally drafted by Sir John Harwood. The masters were now seeking as a body to get out of something that was embodied in the new fair contracts clause. Not one committee only, but a combination of employing committees of the Corporrtion might put their backs to the wall and say they were determined to see fair play between masters and men. Mr. Heenan said he was a Contractor who had had no trouble with his men for twenty-two years. What he feared was tendering for work under conditions that no honourable man could accept. A man could not honestly do work for 1,000*l.* less than another contractor. He had to make up the money in some way. From that point of view he thought the Trades Council clause told in favour of the honest contractor. The resolution of Mr. Abbott, as amended, was carried by 47 votes against 25.

THE LONDON BUILDING ACTS (AMENDMENT) BILL.

THE Lord Mayor, in response to numerous requisitions and resolutions of Ward meetings, has given directions for convening a public meeting of the citizens at the Guildhall on Thursday, March 5, at noon, to protest against the provisions of the London Building Acts (Amendment) Bill, 1903, now being promoted by the London County Council. Among the requisitions received is one from warehousemen of the City, who consider that the provisions of the Bill are "unworkable and an unnecessary interference with business, and that the measure if it becomes law will seriously depreciate the value of property without right of appeal." The signatories include Messrs. J. & R. Morley; Messrs. Cook, Son, & Co.; Messrs. Copestake, Crampton, & Co.; Messrs. Hitchcock, Williams, & Co.; Messrs. Pawsons & Leaf, Ltd.; Messrs. John Howell & Co., Ltd.; Messrs. Sharp, Perrin, & Co.; Messrs. S. Northcote & Co., Ltd.; Messrs. Spreckley, White, & Lewis; Messrs. Thomas Tapling & Co., Ltd.; Messrs. Dent, Allcroft, & Co.; Messrs. Ward, Sturt, & Sharp; Messrs. Rylands & Sons, Ltd.; the Fore-street Warehouse Co., Ltd.; Messrs. Foster, Porter, & Co., Ltd.; Messrs. Bradbury, Greatorex, & Co., Ltd.; and many others.—A resolution was adopted on Tuesday last week by the members of the Streets Committee of the City Corporation in respect to the Bill. The terms of the resolution were as follows:—"That, having regard to the general opposition throughout London to the London Building Acts (Amendment) Bill, a representation be made to the London County Council asking that body to withdraw the measure, and to arrange a conference with the Corporation and the Metropolitan Borough Councils to consider the whole subject, with a view, if possible, to a Bill being framed that will effect the object without needlessly oppressing property owners."—Alderman Sir Henry Knight presided on the 19th inst. over a meeting at Haberdashers' Hall, Gresham-street, of the leading members of the Wood-street trade for the purpose of protesting against the passing of the Bill. Mr. H. Morley moved the first resolution, to the effect that the provisions of the Act were inapplicable to properties for trading or commercial purposes, and would in many cases render premises useless for the purposes for which they were used. Mr. G. Vickery seconded the motion, which was carried. Mr. G. W. Kirkham followed with a resolution condemning the Bill as a dangerous and unwarrantable interference with the actions of traders and occupiers, and would if carried out destroy many centres of industry. Mr. Rowe seconded the motion, which was also carried unanimously. Mr. T. Tapling moved a proposition to the effect that the loss of life from fire in the City had not justified such drastic and ruinous proposals. Mr. G. Lewis seconded the motion, which was carried. A resolution in favour of the Corporation obtaining an amendment of the Building Act, 1894, was also agreed to. Some of the speakers alleged that the London County Council were attempting to throw their responsibility upon the property owners after having neglected to provide adequate fire appliances in London, which, one speaker asserted, was put into the shade by the fire arrangements made in some provincial towns. It was also asserted that if the Bill was passed thousands of poor work girls in the City would be thrown out of employment.—Mr. Alderman Strong presided on the 24th inst. at a wardmote of the electors of Queenhithe, who were called together to consider the provisions of the Bill. The Chairman said there was no doubt that the Bill had a close connexion with the sad fire in Queen Victoria-street, and he could not help thinking that had longer ladders been provided on that occasion there would have been less sacrifice of life. The Metropolitan Fire Brigade was a department of the London County Council, and it would have been better if the Council had permanently reorganised the Brigade and placed it in possession of the best possible appliances for the rescue of perishing people. Mr. Deputy Pryke moved a resolution describing the provisions of the Bill as oppressive and drastic, and ruinous to trade in the City, and suggesting that the Bill should be withdrawn, in order that the County Council, the Corporation, and the Metropolitan Borough Councils might draw up a Bill relating to the same. The motion was seconded by Mr. H. T. Moore, and adopted.

CHURCH, DUNFERMLINE.—A new Church of Scotland building is to be erected in the district of Brucefield, Dunfermline. The plan, prepared by Mr. M'Gregor Chalmers, Glasgow, consists of a nave with two side aisles, with an apse at the east end of the nave. Halls and other offices are also provided. The church will accommodate 723 persons, and the cost will be about 5,000*l.*

METROPOLITAN ASYLUMS BOARD.

THE fortnightly meeting of this Board was held on Saturday, Sir R. M. Hensley presiding.

The Works Committee submitted a report on the fire-extinguishing arrangements at the various hospitals under the Board. From information supplied by the Engineer of the Board they reported that the water supply at Leavesden Asylum was poor, but the matter was under consideration. A similar report came from Caterham Asylum, but it was added in regard to this institution that the use of a portable steam fire-engine of 250 gallons per minute capacity was available. At the South-Eastern Hospital, too, the supply and pressure of water were bad, but a scheme for putting them right had been submitted. At Bridge School, Witham, the supply and pressure were "somewhat questionable," the supply being shut off by the local water company every night and on certain days it was even shut off about noon, leaving the institution with only its storage supply to depend upon. Other institutions in which the supply and pressure were reported as "poor" were Rochester House, and the Eastern Ambulance Station. The Committee added that they hoped at the next meeting to be in a position to report as to whether there was in every case sufficient force and power to ensure the water reaching the highest part of the farthest building.

BOOKS RECEIVED.

QUANTITIES. By the late Professor Banister Fletcher. Seventh edition, revised and enlarged by H. Phillips Fletcher. (B. T. Batsford. 7s. 6d.)

JOURNAL OF THE SANITARY INSTITUTE: Published quarterly. (Sanitary Institute, Margaret-street, W.)

ENGLISH TIMBER AND ITS ECONOMICAL CONVERSION. (London: W. Rider & Son, Ltd. 3s. 6d.)

WILSON'S EQUIVALENTS OF ENGLISH POUNDS AND KILOGRAMMES. (London: Effingham Wilson. 2s. 6d.)

Correspondence.

NEW ART IN STAINED GLASS.

SIR,—There is to be a revolution in stained glass: no longer, as heretofore, the glass, but the lead is to inspire the designer, and be the vehicle for the embodiment of his ideas. He is to think in cames rather than in colour. He is to value the lead for the light it excludes, rather than the glass for the light it admits. For Mr. Sparrow has told the members of the Architectural Association—he said it twice, and with emphasis—that the leading must be accepted as "the most important, the main factor in the design" of the stained glass of the future. We were let into the secret; we were initiated; the new gospel was proclaimed, that no window is so small, but that half-inch leads could, and should, be used; three-quarter and one-inch leads were uncoiled before us; but as from babes the revelation of Sir W. Richmond's inch-and-a-half leads was by merciful economy withheld.

Preachers of new gospels seldom have much respect for old ones; so we find that the works of the old masters in glass (from whom we have learnt all that we know) are not considered by the new school, which Mr. Sparrow represents, to set any standard of excellence at all. But there are still some who hold that the Mediæval glaziers understood their business, and that if, for example, they used narrow leads, it was not without good reason; and with their works before us it would be rash to assert that they were not justified by results. That they did use narrow leads is placed beyond doubt by the following considerations:—

1. When original leads remain, about ⅛in. is found to be a normal width; but, as there is often doubt whether or not re-leading has taken place, the following evidence of intention can be adduced:—

2. When, as sometimes happened in subjects upon quarries, the exigencies of glazing made it desirable to omit some portion of the diagonal leading of the background, while yet the eye required continuity, a sham lead was painted on the glass; and the line so painted to represent the absent lead will be found to be about a quarter of an inch thick.

3. There is still more direct evidence, for old glass will be found to be painted up to within about an eighth of an inch of the edge, indicating leads of about twice that width. There are some fragments in my possession which show this very clearly.

Workers in the old paths scarcely need to be told not to ignore the leads or to shuffle them out of sight. But this is just what the new school, for all its theories, attempts to do; for it throws the leads, as far as may be, into the outlines. This is merely to cause confusion; for it is clear that *all* leads cannot be outlines, and it is curiously true that a thin painted line forms a much more effective, as well as refined outline, whether seen in the aisle of a village church or the lantern of a cathedral, than does a lead. Those who exaggerate the importance of the leading in the scheme of a window have noticed this, and been thereby chagrined, for they use wider and wider leads to force up their main outline, in the attempt to make it hold its own with the painted line. The result is that their windows lack

all refinement, and appear coarse—I will not say in comparison with old windows—but when seen side by side with poorish specimens of commercial glass.

There is much more that might be said of the painting, colouring, and workmanship generally of the new school, but I fear that I have already exceeded the reasonable limits of a letter.

F. C. EDEN.

KING'S COLLEGE AND SOMERSET HOUSE.

SIR,—In an article by Canon Beeching in a recent number of the *Treasury* magazine, the following passage occurs :—

"When in 1829 the Government made a grant to the College of the vacant land on the east side of Somerset House, they made a condition that the river frontage should be completed in accordance with the original design of Sir William Chambers. Every one will allow that this condition was most satisfactorily fulfilled by the architect selected, Mr. Robert Smirke. *The terrace above the Embankment has always been one of the peculiar glories of King's College.*"

I am not aware in what respect the new college buildings were considered a completion of Sir W. Chambers' design, but surely to that distinguished architect the credit for the magnificent river frontage of Somerset House, and of its noble terrace, is wholly due. He did not live to see with inevitable horror the commonplace brick eastern annexe erected by the College authorities, and the comparatively recent addition to this annexe of two stories, overtopping the main building with their crowning ugliness, and deforming the view from the Embankment of his palatial work.

Against this latter act of vandalism Mr. Shaw Lefevre, after he had ceased to be First Commissioner of Works, in vain protested. The college plea of want of funds to provide additional accommodation prevailed—similar pleas have marred many other public buildings.

So far from King's College having any occasion to "glory" in their additions to Somerset House, it seems to me that the style in which these works were completed was their shame and a violation of the conditions attached to the Government grant of the site.

C. N. K.

"L'ART NOUVEAU."

SIR,—In your last issue I am reported to have said to the Leeds and Yorkshire Society that "we should resist the unwholesome *forces* as are affected by what are known abroad as 'Les Nouveaux,'" &c.

What I did say was that "we should resist the unwholesome *forms* affected by what is known abroad as 'L'Art Nouveau.'"

It may not be good French, but it is its recognised title.

I feel so strongly that the warning is necessary that I venture to draw your attention to the mistake, and my protest.

JOHN BELCHER.

*** The account was furnished to us, and was not by our own reporter, but there was no such ungrammatical English in it as is given in Mr. Belcher's quotation, which is incorrect, as he will see if he refers to the report again. "L'Art Nouveau" is of course both correct French and a well known and accepted phrase; but as "Les Nouveaux" was in the report sent to us, we supposed that the speaker had used that expression in regard to the ultra-modern artists.—ED.

The Student's Column.

BUILDERS' TOOLS AND THEIR USES.

CHAPTER 4.

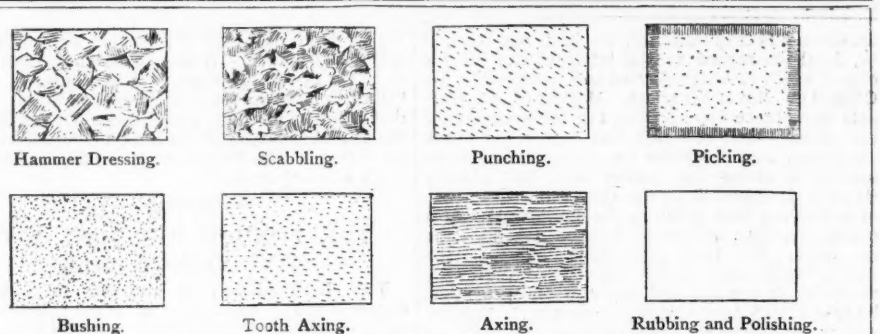
Granite Mason.

THIS chapter will be divided into portions similar to the last.

Quarrying.

As granite is too hard to be quarried by hand tools it is procured by explosives and by wedging, the former process being usually reserved for smaller pieces, and the latter for large blocks.

Explosives.—The present system of blasting Aberdeen granite is to bore a succession of holes from 2 in. to 4 in. diameter, according to the depth of the bed, which may range from 3 ft. to 30 ft., introducing charges, and firing them together by electricity. This starts a big mass, and in the resultant crack or fissure, considerable quantities of gunpowder are exploded to thrust out the "piece" from the "face." The above plan admits of larger stones being reft from the rock with less chance of their sustaining damage. Sometimes monster blasts are fired by electricity, and as much as five tons of gunpowder are stowed away in chambers. The quarrying of these chambers, and of the passages leading to them, may occupy as long as a year.



Illustrations to Student's Column.—I.—Labours to Granite.

Wedging is then resorted to for the purpose of splitting the portions thus thrown down into the sizes wanted. Small steel wedges are driven into the stone by hammers at distances from 3 in. to 6 in. apart, dividing the material with great celerity and little friction. Large lumps are also detached by gadding and wedging, as described in the last chapter, and, although strictly speaking granite has no planes of stratification, it possesses distinct lines of cleavage, and can be worked equally well in any direction.

The Egyptians are believed to have obtained their granite by inserting a row of wedges of dry wood into notches made for the purpose, and then causing the plugs to swell by pouring water over them, which burst the blocks from the face of the quarry. Another effective method adopted by the ancients was to kindle large fires on the top of the rock until it become heated, and then suddenly chill the surface by throwing water upon it. This split the stones into lines of natural cleavage, after which it was broken up as required. Sometimes grooves were first cut, and artificial lines of cleavage caused.

Stone Conversion.

The same general remarks on the conversion of freestone apply with equal force in the case of granite, which is almost always worked and polished at the quarry, as the gain on the cost of labour and carriage for quarry-worked stone is considerable, the expense of the transport of the waste material being saved, except for the difference between the railway rate for worked stone and stone in block. It is also easier to square and dress stone while it contains the ground or "quarry-sap," and local men being more accustomed to it, the conversion is better and more economically performed. This quarry-sap should, of course, be allowed to dry out, to season the stone before commencing building operations, and in this connexion it may be interesting to note that Vitruvius recommended that stone should be allowed to lie two years before being used, so as to permit the natural sap to evaporate, while Sir Christopher Wren specified three years' exposure on the beach for the stone for the erection of St. Paul's.

The sawing of granite is somewhat similar to that described in the previous chapter, and the machines, when in motion, are fed with iron sand and water, the former being called chilled shot by the granite workers in Aberdeen, where it is specially manufactured for this trade. This material is also termed "krushite," and it consists of minute chilled cast metal shot made from scrap-iron, and varying in size from mere powder to clover-seed bulk. Blocks of granite are now being sawn with this material instead of sand at the rate of 4 in. deep per hour, and hard grit stone at 9 in. deep per hour, with twelve blades in the machine. It is superseding diamond saws, as it is capable of doing the same amount of work at one-tenth the cost. In sawing and polishing, one ton of this stuff is equal to about 300 tons of the sharpest sand. For nice sawing, when the granite is cut perhaps $\frac{1}{8}$ in. thick, to be polished on both sides for fancy caskets, samples, &c., the finer kinds of shot are demanded. Recent improvements in machinery, such as the diamond saw and pneumatic chisel, and the use of the rotary cutter in the lathe, have practically revolutionised the granite business.

Granite is dressed by machines on the same principle as those of Messrs. Brunton & Trier, with their revolving metal discs, or of a type resembling the rubbing-machines before mentioned under "Freestone Mason." Polishing is divided into the three processes of shotting, emerying, and glossing. The employment of the fine iron sand or shot mixed with water enables machine-polishing by iron rubbers to be executed about three times as fast as when sea sand was used, and about ten times less of it is necessary. In the second stage emery is employed instead of the shot. Glossing, the last operation, is performed with irons or rubbers covered with flannel or felt, putty powder (oxide of tin) being used as the glossing medium. Some polishers rub oil on the finished stone to deepen the gloss.

Granite for columns, balusters, and circular articles, is worked chiefly in lathes, which are large enough to take blocks 25 ft. long and 5 ft. in diameter. The blocks, when rotated, press and are ground away by the wedge-like action of rather thick steel discs, 6 in. or 8 in. diameter, set at an angle, and moving with an automatic carriage along the lathe-bed. Fig. 90 explains this cutting action. Large lathes have four discs, two on each side, and a column may be reduced some 2 in. in diameter the whole length of the stone by one lateral movement of the carriages along the bed.

For fine grinding and polishing the column is transferred to another lathe, where the required surface is attained by the simple revolution of the granite against heavy iron moulds or rubbers merely placed on top, with the necessary abradents, the moulds being kept in position by a bar of wood (fig. 91). Blocks are prepared for lathe work by being roughed out with a point, and by having holes chiselled in their square ends for the reception of the lathe dog and centres.

All plain surfaces can be done by machinery, but rebates, mouldings, carvings, &c., are cut by hand.

Tools of the Granite Mason.

In addition to the majority of the tools used by the freestone mason, the granite mason employs the following special ones :—

Scabbling hammer.	Bush hammer.
Spalling hammer.	Tooth axe.
Scabbling pick.	Single axe.
Punch.	Patent axe.
Pick.	Steel chisel.

Iron rubber.

Labours to Granite.

The successive stages through which granite passes from the rough to the fine state are indicated in the accompanying diagram.

The *Scabbling Hammer*, as well as the *Spalling Hammer*, are employed for hammer-dressing, which merely consists in reducing and removing the roughness of the stone. The spalling hammer weighs 12 lbs. to 16 lbs., and is shown in fig. 92. Hammer-faced work is also said to be hammer-blocked or quarry-pitched. It is likewise frequently termed rock or rustic work, and is mostly confined to foundations, plinths, and quoins, where a bold massive appearance is aimed at.

The *Scabbling Pick* is used for scabbling, or still further reducing the piece to approximate dimensions and taking down the excessive crudeness of the hammer-dressed work. It is seen in fig. 93, and weighs from 12 to 18 lbs., the length of the head being some 18 in.

The *Punch*, or puncheon, is a blunt pyramidal-pointed chisel required for punching, or bringing the surface to a finer face, such as for copings, curbs, channelling, &c., and for the beds and joints of rock-faced work. The puncheon is of steel, either oval or octagon, 10 in. long and 1 in. diameter (fig. 94). With puncheons and chisels a steel-headed hand-hammer is used, termed a mash-hammer or maul, which weighs from 4 to 5 lbs., and has a flexible hickory handle to give it a spring on the hard stone. For illustration see Bricklayer.

The *Pick*, or pointed hammer (fig. 95), is

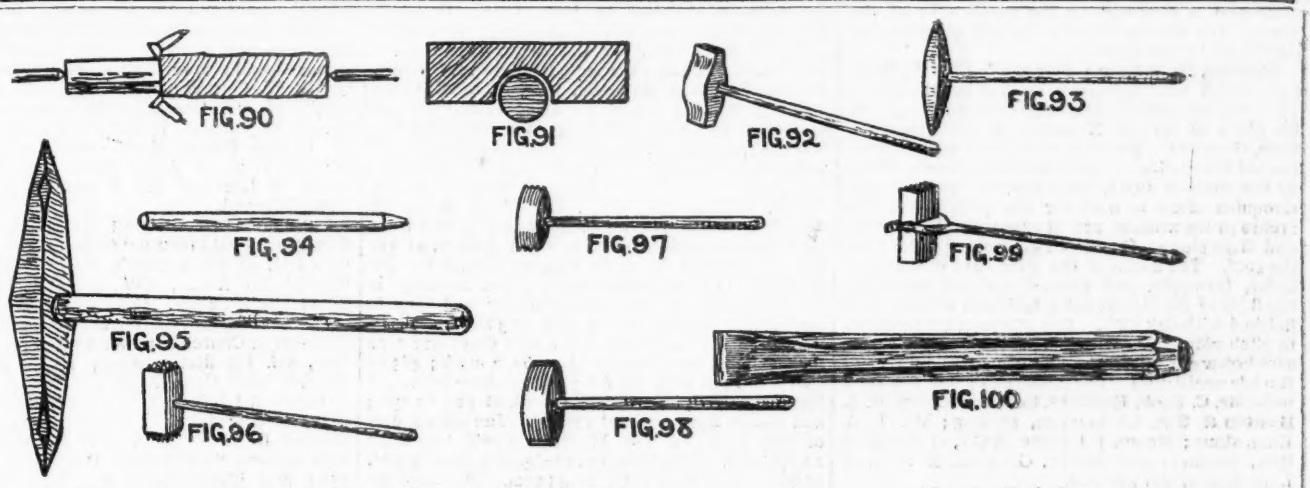


Fig. 90.—Granite Column in Lathe.
Fig. 91.—Polishing Granite Column.
Fig. 92.—Spalling Hammer.
Fig. 93.—Scabbling Pick.
Fig. 94.—Puncheon.
Fig. 95.—Pick.
Fig. 96.—Bush Hammer.
Fig. 97.—Tooth Axe.
Fig. 98.—Single Axe.
Fig. 99.—Patent Axe.
Fig. 100.—Steel Chisel.

Illustrations to Student's Column.—II.

very like the scabbling pick, but lighter, and is employed for picking, or still further producing a finer face, drafted margins being usually run round the parts so dressed.

The *Bush Hammer*, or bunching hammer, is a square prism of steel, 8 in. long and 3 in. square, whose ends are cut into a series of pyramidal points, varying in number and size with the work to be (done, fig. 96). It is used for bushing, bush-hammering, or bunching, pounding off the roughness of the stone, and leaving the face approximately smooth. This kind of finish is only suitable for hard stones, as soft ones are apt to scale with the treatment.

The *Tooth Axe*, or serrated pick, is 4 in. wide, and usually has fine teeth at each end. It is employed for tooth axing, or fine or close-picked work on ashlar masonry. This serrated pick is going out of use in Scotland owing to the trouble and expense of sharpening it, but is still found valuable in Devon and Cornwall (fig. 97).

The *Single Axe* weighs about 12 lbs., and has a head 10 in. long, with two opposite cutting edges about 3½ in. wide (fig. 98). It is known in Devonshire and Cornwall as a muckle hammer, for muckling or splitting up small stones after they have been split by the wedge and feathers. The single axe is required for axing or toning down the unevenness left by the pick, leaving marks in parallel lines, such as in drafted margins, which in granite are usually cut with this tool. Fine-axed work is simply a finer description of the preceding.

The *Patent Axe* is used for going over the surface after it has been brought to as fine a face as possible with the ordinary single axe, and is the finest description of surface work before polishing. Patent-axed work is employed in the best class of building, on monuments, and as a finish to contrast with polished work. It is not intended to take anything off, but merely to mark over the face in an uniform manner. The faces of the hammer are formed of a number of parallel thin steel blades, bound together so as to allow of their being taken out and resharpened. Their size is 6 in. by 3 in., and they vary in number and fineness from 4 to 12 per inch, producing the same number of cuts per inch (fig. 99).

A *Steel Chisel*, as sketched in fig. 100, is used with the mash hammer for drafts, margins, mouldings, &c.

Iron Rubber.—For high-class buildings the final surface on certain parts is rubbing and polishing, the latter being a process of friction only. The stone is put on the machines, and it is first rubbed smoothly with steel filings (termed shot, which is more effectual than the sand formerly used,) and water, under an iron rubber, till all the tool marks are removed; then with emery powder and water, under the same iron rubbers; and finally the rubbers are covered with felt or flannel, and putty powder (oxide of tin), moistened with water, takes the place of the former abradents to produce the final gloss. A paste of beeswax and turpentine is sometimes used instead of the putty powder. A good polish can only be obtained by persistent rubbing, and will keep its lustre for half a century.

Large plane surfaces are usually polished by a machine termed a vertical. It is an iron wheel-shaped ring revolving on the surface to be polished, and driven by a vertical shaft. A lighter wheel is used for emery, and a felt-covered wheel for glossing. Straight mouldings are done by a "pendulum"—that is, a reverse to the moulding is cast in iron or other metal, and worked by machinery backwards and forwards on the moulding with a pendulum motion. Broken surfaces, as in a case where carved and polished work intermingle, are polished by hand.

GENERAL BUILDING NEWS.

WESLEYAN SUNDAY SCHOOLS, HAYLE, CORNWALL.—New Wesleyan Sunday schools have just been opened at Hayle, and the chapel has been renovated, re-seated, a vestibule placed at the entrance, and a new organ, built by Messrs. Hele & Co., Plymouth, obtained. New vestries and other accessory rooms have been added. The contract was secured by Messrs. White & Thomas, Crowan. Mr. Sampson Hill, Redruth, was the architect, and Messrs. Isaac Newton & Sons, Hayle, the decorators.

POLICE STATION, ABERTILLERY.—A new police station and courthouse have been erected at Abertillery. The contract for the building was let to Messrs. D. W. Richards, Ltd., of Newport. The frontage to Cwm-street is 90 ft. and to Queen-street 120 ft., the depth between the streets 150 ft., and the rise from Cwm-street to Queen-street 36 ft. To obviate the difficulty as to the site, the buildings have been erected in two blocks, that fronting Cwm-street consisting of police entrance, charge office, three cells, constable's dayroom and offices, with accommodation for ten single constables, a superintendent's office, married sergeants' quarters, consisting of parlour, living-room, scullery, &c., and three bedrooms. The quarters in each instance are private, connected inside by doors, and having separate entrances. The buildings were designed by Mr. William Tanner, County Surveyor, and erected under his direction.

SCHOOLS, EDINBURGH.—Edinburgh School Board intend to erect a new school in Albion-road to give accommodation for 1,403 pupils. The architect is Mr. J. Carfrae, Architect to the Board.

ASYLUM BUILDINGS, TALGARTH, BRECONSHIRE.—The new asylum serving the counties of Brecon and Radnor was opened recently. The buildings have been erected from plans prepared by Messrs. Giles, Gough, & Trollope, Strand, London, the contractor being Mr. Watkin Williams, of Pontypridd. The buildings cover about seven acres, the contract price being about 120,000*l.*

BAPTIST TABERNACLE, HERTFORD.—It is proposed to erect at Hertford a new Baptist tabernacle on the site adjoining the present tabernacle at the bottom of Port Hill, from the designs prepared by Mr. James Farley, architect, of Hertford. Seating accommodation will be arranged for 500 persons, a gallery being erected facing the rostrum for the purpose of providing the necessary number of seats. The baptistry will be placed under the floor of the rostrum, and three vestries will be provided in the rear, with classrooms over. The lighting will be by electricity, and the ventilation will be effected by an ornamental turret placed in the centre of the main roof. The whole of the buildings will be heated with hot water on the low-pressure system.

CATHOLIC CHURCH, WREKENTON.—The Wrekenton Catholics have just erected a new church, to be known as St. Oswald. The church is a stone structure, built in the Early English style, the inside being built up with concrete instead of brick. The seating accommodation is for 350, and the building, which cost 3,000*l.*, was erected by Mr. R. Bruce, of Washington, Mr. J. C. Parsons, of Newcastle, being the architect.

DUNFERMLINE COTTAGE HOSPITAL.—This building is to be extended by additions to the east and west wings of the hospital and a rearrangement of the wards. The plans have been prepared by Messrs. Sydney Mitchell & Wilson, Edinburgh. The additions are estimated to cost 3,000*l.*

DISPENSARY, CHELSEA.—On the 20th inst. Lord Cadogan laid the foundation-stone of the new Chelsea, Brompton, and Belgrave Dispensary, now being erected in Manor-street in place of the old building at Sloane-square. The architects of the new building are Messrs. A. W. Sheppard and J. F. Burkinshaw, of Adelphia, W.C. The main structure is being built of red brick relieved with terra-cotta dressings. A residence will be provided for the house surgeon, also a committee-room, &c., for the management; and provision is also made for waiting and consulting rooms, with an isolation-room and dispensing department and workrooms attached. The building will be fitted with electric light. The builders are Messrs. Stimpson & Co., of Brompton-road, and the cost will be 3,000*l.*

SCHOOL BUILDINGS, SHEFFIELD.—The Buildings Committee of Sheffield School Board in their minutes recommended that Messrs. Holmes & Watson be instructed to prepare plans for the provision, at Carter Knowle-road, of a school to accommodate 600 children, on one story, and with central hall; the building to be appropriated for a mixed department and an infants' department, with provision for further classrooms to be added hereafter. The plans for the proposed school at Norton Woodseats, to accommodate 340 children, as submitted by Messrs. Hemsoll & Paterson, were adopted. The Committee reported that they had had under consideration the question of school accommodation in the district, comprising Upper Crookes and Lydgate, and they recommended that a plot of land containing 8,479 square yards fronting to Lydgate-lane be purchased from the trustees of the Harper House Estate of the Society of Friends for the sum of 1,300*l.*, for the purpose of erecting a public elementary school thereon. The Committee also recommended that a plot of land containing 3,693 square yards fronting to Sharrow-lane and Sitwell-road be purchased from the trustees of the Girls' Charity School for the sum of 2 585*l.* 2s., on which to provide buildings for a school for defective children, a cookery centre, and a centre for manual instruction. —The minutes were adopted.

THEATRE, FALKIRK.—The plans for the new theatre to be erected in Vicar-street, Falkirk, by the Falkirk Grand Theatre and Opera Co., came before the Dean of Guild Court on the 20th inst. The theatre, which is to be situated behind a large new tenement of shops and dwelling-houses, will be partly built on the cantilever system, and have seating capacity for 2,000 people. The estimated cost of the erection is about 15,000*l.*, and the architect is Mr. Alex. Cullen, Hamilton.

CAIUS COLLEGE, CAMBRIDGE.—We understand that Messrs. Aston Webb and Ingress Bell have been appointed architects to carry out the reconstruction of the buildings which form one side of Rose-crescent, and were altered a few years ago by the authorities of Caius College for "rooms" as attached to the college. At the Trinity-street end of Rose-crescent stands St. Michael's Church, opposite the new portion of the buildings, on the west side of Trinity-street, of Caius College. It is stated that the Master and Fellows contemplate the acquisition of the church to replace the present college chapel. The church was built in 1324 by Hervey de Stanton, who gave it to his foundation of Michael House, since absorbed in Trinity College. It is in the Decorated style, and has a massive square tower and a very long chancel. After a fire on November 11, 1849, a sum of 3,000*l.* was expended in repairs and improvements under the superintendence of Sir G. Gilbert Scott, who decorated the aisles and chancel and built the north

porch and a doorway on the south side of the tower. The chancel retains the old triple sedilia, piscina, and choir stalls of oak.

CHURCH, HEREFORD.—St. James's Church, Hereford, which was destroyed by fire in December, 1901, has been rebuilt, and recently completed, from the plans of Messrs. Nicholson & Hartree, architects, Hereford. The new edifice has been built on the old foundations. Bath stone has been used for all the dressed stone, both exterior and interior. Campden stone is used for the pillars, and the arches of the arcades are of alternate Bromsgrove and Bath stone. Green Westmoreland slates form the roof. The floors of the gangways in the nave, aisles, transepts, and chancel are laid with tiles, the floor of the church being laid with wood blocks, finished with oak curb. The whole of the roofs are in pitch-pine. The church is heated by a high-pressure hot-water apparatus, and ventilated by two of Boyle's ventilators. The contractors for the work were Mr. C. Cook, Hereford, builder; Messrs. R. L. Boulton & Son, Cheltenham, carving; Mr. T. A. King, stone; Messrs. J. Jackson & Co., of Birmingham, heating; and Messrs. Goodwin & Sons, of Lugwardine, laid the tiles.

REBUILDING IN PICCADILLY.—An extensive clearance has been made between the Royal Geological Museum and St. James's Church by the demolition of Nos. 198, 199, and 200, Piccadilly, and Nos. 2, 3, 4, and 5, Church-place. The new buildings are being erected by Messrs. W. H. Lorden & Son, of Upper Tooting, contractors, from plans and designs prepared by Mr. R Sawyer.

WESLEYAN CHURCH, SOUTH WIMBLEDON.—Plans and designs for a new Wesleyan church and schools at South Wimbledon have been made by Mr. R. J. Thomson. A site and the organ are given by a resident, and the scheme in its entirety will cost some 12,000*l.* The buildings will comprise a choir, vestry, and minister's vestry, a church parlour, a clubroom, two meeting-room, &c.

FOREIGN.

FRANCE.—The Committee of the Société Nationale des Architectes has adopted for their competition this year a subject and instructions drawn up by M. Nanteuil, for "A large Restaurant in a Park."——M. Frantz Jourdain, the architect, has been elected President of the "Société Nouveau Paris," the Vice-Presidents being MM. Albert Besnard and Felix Roussel.——The jury for the annual competition in new façades is about to commence its labours. They will have to examine about a hundred house fronts erected during 1902.——The Department of Public Instruction has decided that female art students between the ages of fifteen and thirty are in future to be eligible to enter into competition for the Prix de Rome.——The Baroness Nathaniel de Rothschild has left to the Académie des Beaux-Arts an annual "rente" of 5,000 fr. to be distributed among artists incapacitated by blindness or paralysis.——At the Durand Ruel Gallery there is an interesting exhibition of the "Société Nouvelle de Peinture et de Sculpture," which includes among its principal members MM. Eugène Vail, Lucien Simon, Griveaux, La Gandara, and Henri Martin. Among the sculpture is a pathetic work by M. Bartholomé, "L'Enfant Mort."——M. Chailloux, the sculptor, has just completed the model for a monument to Pasteur to be erected at Marnes, near Ville d'Avray. The bust of Pasteur will be placed on a stele designed by M. Jaumin, architect.——M. Rousseau, architect, of Sens, has been commissioned to undertake the restoration of the church of Laroche-Saint-Cydoine.——A practical School of Commerce and Industry is to be built at Cluny (Saône-et-Loire), at an estimated cost of 400,000 francs.——The jury of the competition for a decorative fountain for the city of Reims has selected the following artists to take part in the second and final competition: MM. Deperthes (architect) and Roussel (sculptor); MM Godefroy (architect) and Peynot (sculptor); MM. Larche (architect) and Larche (sculptor); and M. Narjoux (architect).——M. J. R. Pierre Litoux, architect, of Paris, has died at the age of 63. He was a pupil of Questel, and in 1870 obtained the second premium in the competition for the new church of St. Bruno at Grenoble. He was the architect of numerous mansions in the neighbourhood of the Madeleine and the Avenue du Bois de Boulogne.

MISCELLANEOUS.

PROFESSIONAL AND BUSINESS ANNOUNCEMENT.—Messrs. Needham & Needham, architects, have removed their offices from 18, Lower Clapton-road, to 16, St. Helen's-place, E.C.

WORKMEN'S DWELLINGS, MILLBANK.—On the 18th inst. the King visited the new workmen's dwellings which the London County Council have erected at Millbank. Since the destruction of the old prison the estate has been divided up between the Tate Gallery, the Guards' Hospital, the School Board, and the County Council. For its eight-acre share of this estate the Council paid in December, 1896, after negotiations lasting many years, 2,500*l.* an acre. By 1898 roads were laid out, and by May, 1899, the first block of buildings was erected, and named Hogarth Buildings. Plans for Leighton and Millais buildings were completed in 1898, and the buildings finished in July, 1900. Romney, Rossetti, Turner, and Ruskin Buildings were completed in April, 1901. In December, 1899, tenders were invited for Gainsborough, Reynolds, Lawrence, Maclise, Landseer, Mulready, Morland, and Wilkie buildings, and the last of these blocks was finished in August last year. Although a competition was held and premiums awarded for the best designs, all were found too expensive, and the work was eventually carried out by the Council's own architects, Mr. T. Blashill, and, later, Mr. W. E. Riley. A garden covering a space of 23,190 sq. ft. will soon be completed, and a piece of open ground, as yet not needed, will be made into a sand-pit for the children. One of the features of the buildings is the provision of fifty perambulator and bicycle sheds, let to tenants at the rate of 3d. a week. In the seventeen blocks on the estate there are two tenements of one room let at 4s. 6d. a week; 484 of two rooms, at 6s. to 8s. 6d.; 392 of three rooms, at 8s. to 10s. 6d.; 16 of four rooms, at 12s. to 13s.; and one of five rooms, at 12s. 6d. The actual cost of the land for the Millbank estate has been 22,242*l.*; of the approaches, roads, and open spaces, 22,960*l.*, making a total of 45,202*l.* The approximate cost of the buildings has been 206,959*l.*

TECHNICAL EDUCATION IN AMERICA.—The Principal of the Northampton Institute, London, Dr. R. Mullineux Walmsley, is being sent on a three months' tour to the United States and Canada for the purpose of investigating the present position of technical education in those countries and its bearings upon industrial production in the subjects covered by the technological work of the Institute, but more especially in the engineering industries.

"THE MAGAZINE OF ART."—We hear that as the result of the new management of the *Magazine of Art*—the reduction in price and the increase in bulk—the circulation of the first three months has been exactly doubled, as compared with that of the previous quarter.

WORCESTER MASTER BUILDERS' ASSOCIATION.—The fourth annual dinner in connexion with this Association was held at the Hop Market Hotel recently. In the absence of the President (Mr. J. Sharman Wood) who was indisposed, the Vice-president (Councillor J. Bromage) presided, and the hon. treasurer (Mr. J. Stokes) was in the vice-chair. The loyal toasts having been honoured, the Vice-Chairman gave "The Mayor and Corporation," to which Councillor A. H. Parker responded. The Chairman, proposing "Success to the Midland and Local Federation of Master Builders," said that although the Federation had been in existence some years it had only exhibited real life during the last five years. He explained some of the troubles leading up to its formation, and dwelt on the benefits which had been derived since. Not only did the Federation resist unreasonable demands from trades unions, but builders meeting together and rubbing shoulder to shoulder were enabled to do more good for the men and trade. In Worcester they had every reason to be thankful for the existence of the Federation. Every man now worked the same hours and had the same hours for meals. Formerly builders were not allowed to import worked stone, but now they were able to do what they desired in the best manner. Councillor A. S. Smith (Birmingham), replying, stated that he regretted the necessity of the Federation; but they existed not as an aggressive body, but for the purpose of resisting unreasonable demands. He warned them that unless they held together and used federation wisely and well, they would lose much of their importance. Mr. Phelps also replied, and said he was pleased to state that there had been an increase of seven in the membership of the Worcester Association, which now numbered thirty-eight. The amount of wages paid by members to their employees during the year was 53,400*l.* He was in the happy position of being able to state that locally there had been no disputes during the past year. By means of arbitration they had been able to complete rules with the plumbers. Notice had been given to the Malvern branch to bring their rules into conformity with those of Worcester, but as there had been no reply he concluded that the men saw the wisdom of adopting the suggestions. Arrangements had been made for regular hours during the summer and winter, so that at present, although trade was slack, there were fewer unemployed men than might be expected. Councillor J. Jones proposed "Trade and Commerce of the City," and Alderman W. Caldicott responded. Mr. H. Stokes proposed "The Architects of Worcester," coupled with the name of Mr. A. B. Rowe. Mr. Rowe, responding, said the architects were in full sympathy with the Association. He did not agree with Mr. Stokes that architects were down on contractors. They desired to act honourably to both clients and contractors. The Vice-Chairman gave the health of the Chairman, who suitably replied.

YORK MASTER BUILDERS' ASSOCIATION.—The annual dinner of the York Master Builders' and Contractors' Association was held recently at the Old George Hotel, Pavement, when between forty and fifty members and friends assembled. Mr. Councillor Mansfield presided. After the loyal toasts were honoured, Mr. R. Dent proposed "The Yorkshire Federation of Building Trades Employers," and Mr. J. Dawson, of Huddersfield, in responding, referred to the proposed amendment of the law relating to trade unions, and said that employers throughout the country only wanted what was fair and equitable between masters and men, and it was quite just that the law which referred to trades unions should also refer to employers' associations. Mr. A. W. Sinclair gave "Success to the Association," and Mr. Councillor Mansfield and Mr. H. Colman responded. In the unavoidable absence of Mr. George Sharp, Mr. Goodwill proposed "The City and Trade of York," which was responded to by Mr. M. Leaf and Mr. Councillor Moss. Other toasts followed.

INCORPORATED CHURCH BUILDING SOCIETY.—This Society held its usual monthly meeting on the 19th inst. at the Society's House, 7, Dean's Yard, Westminster Abbey, S.W., the Rev. Canon C. F. Norman in the chair. Grants of money were made in aid of the following objects, viz.:—Building new churches at Churchdown St. Andrew, near Cheltenham, 50*l.* for first portion; Radyr St. John the Baptist, near Cardiff, 75*l.* for first portion; and Keighley All Saints, Yorks, 80*l.* in lieu of a former grant of 60*l.*; towards rebuilding the churches of Rowley Regis St. Giles, near Birmingham, 105*l.*; Swanscombe St. Peter and Paul, near Greenhithe, 75*l.*; and Walthamstow St. James the Greater, Essex, 130*l.*; and towards enlarging or otherwise improving the accommodation in the churches at Alwalton St. Andrew, near Peterborough, 25*l.*; Mumby St. Peter, near Alford, Lincs, 20*l.*; Radnage St. Mary the Virgin, near Stokenchurch, Oxon, 15*l.*; Shotton St. Saviour, near Castle Eden, R.S.O., 50*l.*; and Swaffham Prior St. Mary, near Cambridge, 130*l.*, in lieu of a former grant of 100*l.* The following grants were also paid for works completed: Radley St. James, near Abingdon, Berks, 30*l.*; High Wycombe St. John, Bucks, 175*l.*; Marston Magna St. Mary, near Bath, 35*l.*; and All Stretton Mission Church, Shropshire, 50*l.* In addition to this the sum of 151*l.* was paid towards the repairs of thirteen churches from trust funds held by the Society.

IRISH MINERALS AND BUILDING STONES.—The Department of Agriculture and Technical Instruction for Ireland have taken steps to place on view for a period of three months at the Imperial Institute, London, the extensive collection of Irish minerals and building stones which formed part of their exhibits at the recent Exhibition in Cork. The exhibits will embrace samples of the varied building materials and marbles in which Ireland is particularly rich, and it is expected that the opportunity of examining these samples will be of advantage to those who are concerned in the many large building schemes now in progress in London and elsewhere in Great Britain. Besides Irish granites, sandstones, limestones, red, green, and black marble, and other ornamental stones of the country, the exhibit will also include specimens of clays, cement-making materials, and fine sand. The Mineral Expert to the Department will remain with the exhibit during the period mentioned, and all inquiries should be addressed to E. St. John Lyburn, F.G.S., Irish Mineral Section, Imperial Institute, London, S.W. The exhibition will be open free to the public from February 26, 1903, between the hours of eleven and five. Admission will be by the east public entrance of the Imperial Institute.

ATMOSPHERE ON THE CENTRAL LONDON RAILWAY.—At the meeting of the London County Council on Tuesday, the following Report of the Public Health Committee was submitted: "We have been in communication with the Parliamentary Committee on this subject, and in connexion with the conduct of the Council's case with regard to Tube Railway Bills, they have obtained reports from the medical officer and the chemist as to the condition of the atmosphere in the stations, lifts, passages, and tunnels, as compared with the condition of the atmosphere in the streets outside the stations. Eighty-eight samples taken between March 10 and October 24, 1902, were submitted to chemical examination, and twenty-four samples taken between March 18 and June 19, 1902, were bacteriologically examined by Dr. Andrewes. . . . The chemical examination consisted in the determination of the amount of carbonic acid in the air, and of the amount of oxygen absorbed from permanganate by the organic matter present in the air. It was found that the quantity of carbonic acid in the air of the Central London Railway varied considerably, while the quantity present in the outside air varied only to a slight extent. The amount of organic matter present in the air of the tubes and in the external air underwent considerable fluctuations. The general result of the chemist's examination shows that the quantity of carbonic acid was highest in the air of the carriages, and that, contrary to what might reasonably have been expected, the largest quantity, 14·7 volumes in 10,000 volumes of air, was not found in the carriages where smoking was allowed, but in an ordinary passenger carriage. The smallest quantity found (9·6 volumes in 10,000 of air) was in an empty carriage. The air in the passages leading from and to the stations was generally better than in the lifts. On one occasion the air in the lift at the Oxford-circus Station contained 15·2 volumes of carbonic acid in 10,000 volumes of air, or about four times the quantity found in the fresh air outside the station. Several samples of air were collected at midnight or early in the morning after the tubes had been ventilated by the passage of air and before the morning traffic had commenced. The examination of these samples showed, in most instances, that a

very fair condition of the air had been produced by the ventilation, although it was still somewhat inferior to that of the outside air. Generally, about 78 per cent. of the samples collected contained more than twice as much carbonic acid as that found in outside air, and 66 per cent. contained more than 2½ times as much. The chemist considers that samples of air taken at any point on the railway should not contain more than 8 volumes of carbonic acid in 10,000 volumes of air—that is, not more than twice the amount which is generally found in the streets. He suggests this standard of purity in view of the fact that all the additional carbonic acid found in the air of the tunnels has been produced by respiration, and is therefore of a more objectionable character than that produced by the combustion of fuel in the locomotives, or of gas or oil for lighting purposes. . . . Dr. Andrewes made bacteriological examinations of twelve samples of air from different points on the Central London Railway, and compared them with twelve similar samples taken at the same time from the fresh air outside. In summarising the results, Dr. Andrewes concludes that while micro-organisms are present in tube air in a somewhat greater proportion (thirteen to ten) than in fresh air, the excess is not so considerable as to cause the tube air to compare unfavourably with the conditions known to exist in inhabited rooms generally, and although there was considerable excess of organisms capable of growing at the temperature of the body, this excess was due to non-pathogenic sarcinæ and allied species, and no pathogenic organisms were found in the tube air. The highest averages were found in carriages and lifts, *i.e.*, in the most crowded places examined, while the platforms and passages came out actually better than the fresh air, and the tunnels were only a little worse. There was a direct correspondence between the amount and concentration of human traffic and the number of organisms in the air. . . . We have been informed that the Central London Railway Company are taking steps to improve the ventilation of the tunnels by installing a large rotary fan at the Shepherd's Bush end which will be powerful enough to draw out all the tunnel air three times over in the three hours during which the traffic is stopped at night. They also state that they are installing at the Bank station an air-compressor, which will force compressed air drawn from the street level into the extreme end of the Bank sidings while the trains are in motion, and thus purify that part."

WAR MEMORIAL, NORWICH.—It is intended to erect in Norwich a memorial of the men of Norfolk who fell during the Boer War. It is intended that the monument shall be erected on the ground to the north-east of the Shirehall, facing down the Prince of Wales'-road, a site open to good view on three sides, and out of the line of general traffic. The designs for the monument accepted are by Mr. George Wade, sculptor, and his brother, Mr. Fairfax Wade, architect.

LEGAL.

BUILDING DISPUTE AT EALING.

THE case of Wright *v.* Berry came before the Court of Appeal, composed of the Master of the Rolls and Lords Justices Romer and Cozens-Hardy, on the 18th inst., on the plaintiff's appeal from a judgment of Mr. Justice Byrne in the Chancery Division.

The action was brought by the plaintiff for an injunction to prevent defendants erecting on a couple of plots of land in Regina-road, Ealing, which they had bought, buildings which it was alleged they intended to use as homes for poor aged persons. The plaintiff contended that this intention of the defendants was a contravention of the building scheme of the St. Kilda Estate. It appeared that in March, 1899, the St. Kilda Estate at Ealing was advertised and put up for sale. In the particulars and conditions of sale it was described as consisting of 133 large choice plots for the erection of private residences. There was also attached to the particulars a condition that no building of any kind other than a detached or semi-detached house, with appropriate offices and outbuildings appurtenant thereto, should be erected on any plot. The defendants, three days before this sale, purchased two of the plots, and in the conveyance the defendants covenanted with the vendor not to erect any buildings of any kind on the lots so purchased other than a detached or semi-detached house in the terms of the before-mentioned condition. The plaintiff afterwards purchased, under similar conditions of sale, four of these lots, which were situated opposite to those purchased by the defendants, on which he built four private dwelling houses. The defendants did not build on their plots until Sept., 1900, when they put up a notice stating their intention to build a home for poor people, and asking for subscriptions. The plaintiff, on protesting against this, was informed that the defendants' proposed building would only be a private house. In November, 1901, the defendants commenced to build, on behalf of the Ealing Cottage Homes for the Aged Poor, a set of self-contained living-rooms for the accommodation of about fourteen families, with a common entrance, kitchen, sink, and offices, but otherwise independent of each other. The plaintiff's case was that such an erection by the defendants would diminish the value of his property. The plaintiff then commenced the present action, and in March last applied for an interlocutory injunction to restrain until the trial the erection by the defendants on their plot of any building except a semi-detached or detached house. Mr. Justice Byrne, however, dismissed the application, on the ground that what the plaintiff really complained of was the proposed use of the buildings in question, but that that was not the relief asked for by the notice of motion. The plaintiff then amended his pleadings and asked for an injunction to restrain defendants from using the houses otherwise than as private residences. Mr. Justice Byrne at the trial held that there was no such obligation on the defendants, and gave judgment for the defendants. Hence the present appeal of the plaintiff.

At the conclusion of the arguments of counsel their Lordships affirmed the decision of Mr. Justice Byrne, and dismissed the appeal with costs.

Mr. Mulligan, K.C., and Mr. Underhill appeared for the appellant; Mr. Levett, K.C., and Mr. O. Leigh Clare for the respondents.

FALSE TRADE DESCRIPTION.

AT Greenwich Police-court recently, Mr. James Gladstone, of Catford Bridge, builders' merchant, was summoned by Mr. Lionel Harold Browning, secretary of the London Lime, Cement, Brick, and Slate Merchants' Trades Protection Association, for unlawfully using false or unjust measures or sacks, also for selling cement to which a false trade description as to its weight was applied. Mr. R. D. Muir was counsel for the prosecution; and Mr. Llewellyn Davies defended. Charles Long said he was employed on December 20 by Messrs. Eastwood & Co. to go to the defendant's premises at Catford for a ton of cement. He saw the defendant and asked for a ton of cement, and received eleven sacks and an invoice for a ton. He took the sacks to Messrs. Eastwood's Well Hall depot. William Saunders, foreman at the depot, deposed to receiving the sacks, which he at once sealed, and afterwards sent to Greenwich. Mr. Ernest Scragg, foreman at Messrs. Eastwood's Phœnix Wharf, Greenwich, said he weighed the bags, which in the total were 163 lbs. short. Sydney James Bolt, another carman, proved a further purchase, which Mr. Scragg said was 172 lbs. short. Albert Letchford gave evidence of a third purchase, which was said to be 205 lbs. short. Mr. Harry Le Marchant, managing director of Messrs. Martin, Earle, & Co., wholesale cement merchants, deposed that his firm supplied the defendant with cement. In the ordinary course eleven sacks to the ton would be supplied, but at the defendant's request he was supplied with twelve sacks to the ton. In cross-examination, witness admitted that many of the defendant's orders were eleven sacks to the ton, and he produced only three orders where twelve sacks were specified. Mr. Harold Anderson, director of the Associated Portland Cement Manufacturers, also deposed to the sale of cement to the defendant in ton lots contained in twelve sacks. For the defence, Mr. Davies said his client's instructions to his foreman were to supply the correct quantity, and if there was any deficiency to make it up. The defendant said he purchased the twelve sacks to the ton for the convenience of small dealers. His special instructions to his foreman were that if there were no eleven to the ton bags and any one wanted a ton, he was to break a bag and distribute it among the eleven, so as to make up the weight. His manager informed him that he had sold eleven sacks to the ton (this being the third purchase), and witness told him to go off at once and rectify his mistake. He had been in business for many years, and this was the first complaint he had received. Any shortness of weight was without his knowledge. Alexander Campbell, clerk to the defendant, said he told Mr. Gladstone about the purchase, and was sent to the carman's employer to rectify the error. Mr. Baggallay said there was clearly a false trade description, and the defendant had not proved that he was unaware of what was going on. He fined the defendant 10*l.* and ten guineas cost. Mr. Muir said he would not proceed with the weights and measures case.

HARROGATE BUILDING DISPUTE.

THE hearing of the case of the Mayor and Corporation of Harrogate *v* Dickinson was concluded in the King's Bench Division on the 21st inst. before Mr. Justice Wright, sitting without a jury. The case came before his Lordship in the form of a special case, from which it appeared that Mr. Dickinson is a builder who owned a plot of land in Walker-road and Bilton-drive, Harrogate. On October 1, 1894, he deposited plans showing eleven dwelling-houses and two stables and coach-houses proposed to be erected by him on the plot of land referred to. These plans, which were contained on one sheet, were approved on October 8, 1894, and certificates were given in respect of certain of the houses which were built. Section 27 of the Harrogate Corporation Act, passed on August 24, 1893, provides:—"The deposit with the Corporation of any plan of any street or building shall be null and void if the execution of the work specified in such plan be not commenced within the following periods—that is to say, as to plans deposited after the passing of this Act within three years from the date of such deposit, and as to plans deposited before the passing of this Act within three years from the passing of this Act; and at the expiration of these respective periods fresh notice and deposits shall, unless the Corporation otherwise determine, be requisite." On January 3, 1902, defendant commenced to build the second stable and coach-house, and on the 18th the inspector employed by the Corporation gave him notice that he was to discontinue building and deposit fresh plans, the old ones not complying with the new by-laws in several particulars.

Mr. Danckwerts, K.C., and Mr. Wm. Mackenzie appeared for the plaintiffs, and Mr. Colefax for the defendant.

Mr. Danckwerts having read the special case, his Lordship said he would like to hear what was the point of the other side.

Mr. Colefax said that the case did not entirely refer to what was called the second stable. It went beyond that, because the second stable was being built, and also the houses Nos. 6 to 11. After the expiration of the three years Nos. 4 and 5 were commenced, completed, and certified, and No. 5 included the party-wall of No. 6. It was not until after the new by-laws came into force in 1901 that defendant began to build the stables. The foundations of the party-wall of No. 6 had been built since the expiration of the three years, and Nos. 4 and 5 were completed before the new by-laws came into effect. These were the facts, and he did not think there was any doubt about them. What defendant submitted was this, that, subject to the Section of the Act of 1893, he was entitled to continue to build under the by-laws which were in force at the time when the plans were passed. The learned counsel submitted that this would be so because of the last clause of the new by-laws, Clause 117, which said that from and after the date of the confirmation of the new by-laws all by-laws relating to new streets and buildings were repealed, except as regarded any work commenced before the date of the confirmation, or any work not so commenced but of which plans had been either approved before that date or had been sent to the Surveyor one month before such date and not disapproved by the Council.

His Lordship: This is not work commenced before the confirmation of the by-laws.

Mr. Colefax submitted that it was, and called the attention of the learned Judge to a decision of Vice-Chancellor Hall in a case heard in the Palatine Court of Lancaster, where it was held that the work was begun with the deposit of the plans, though the whole of the work had not been commenced.

His Lordship: The deposit of the plans is the commencement of the work?

Mr. Colefax: Yes.

Mr. Danckwerts: I can shorten the matter by saying that but for Section 27 of the Act of 1893 the defendant would be entitled to go on with these buildings.

His Lordship: Under the old by-laws?

Mr. Danckwerts: Yes.

Mr. Colefax: Then that means that within the meaning of this By-law 117 we had commenced the work before the passing of the new by-laws.

Mr. Danckwerts: No.

Mr. Colefax (continuing): Contended that on the words of By-law 117, "or any work not so commenced," the case came within the judgment of Vice-Chancellor Hall. In that case plans had been deposited before the date of the new by-laws, but some of the buildings had not been commenced, and the Vice-Chancellor decided that inasmuch as some of the houses on the plan had been built, that was a commencement of the whole work.

His Lordship, in giving judgment, said that no doubt this was a most important question, on the one hand to the individuals concerned, and on the other to the Local Authority, who were bound as far as they could to see that all the latest improvements were carried into effect. The point here was whether the old by-laws or the new by-laws applied. The builder said that the old by-laws applied because No. 117 of the new by-laws, repealing the old ones, excepted two classes of cases, and it was argued that the buildings now in question formed one or other or both of these exceptions, and were therefore governed by the old and not by the new by-laws. In fact, the whole case was based on the view that these plans, which were approved in 1894 by the then Sanitary Authority, were one plan. If they were one plan for the whole of the purpose of this case, then there was no question that the work was commenced on that plan, and that the approval of the Corporation was still in force. He did not think that the grounds which had been advanced were maintainable. It seemed to him that these were simply a number of plans for convenience put on one sheet of paper in order to show the Sanitary Authority what the general scheme of arrangement was to be. The old by-laws provided for a plan of each building, and if the present was not a plan of each building, then he very much doubted whether the by-laws had been complied with at all. He could not agree with the argument that because some of the buildings had been commenced therefore all had been commenced

As regarded the decision of Vice-Chancellor Hall, it did not touch this case. It really proceeded on a proviso which did not exist in the present by-laws as to the validity of work done under the old by-laws. If he was right in this view, they had several plans before them, and not one plan, and Section 27 of the Act of 1893 provided expressly that deposited plans became null and void after three years. As regarded the particular houses now in question, the three years had elapsed without anything being done upon them, and judgment must therefore be for the plaintiffs.

Mr. Danckwerts asked whether the costs would follow the judgment.

His Lordship: The plaintiffs are to have their costs if they wish to ask for them; at the same time they might properly think fit not to press for them. This is quite an arguable case.

Mr. Danckwerts said that the Town Clerk was present in Court, and he would convey his Lordship's wishes to the proper quarter.

PATENTS OF THE WEEK.

APPLICATIONS PUBLISHED.*

3,597 of 1902.—J. CRAWFORD-MOORE: *Opening and Closing Doors.*

A door-closing apparatus consisting of a cylinder or tube made to be placed in or nearly in a vertical position on the door or door frame, with a rod turned downwards connecting the piston rod with the bracket.

2,765 of 1902.—J. J. CUNLIFFE and F. G. GUNHOUSE: *A Draught and Dust Preventer.*

A draught and dust preventer fixed on the inside of the door and moved perpendicularly by means of a chain, cord, and a weighted lever.

6,556 of 1902.—G. C. MACKROW and H. G. CAMERON: *Elevating or Hoisting Apparatus.*

This consists in the combination with upper and lower sheaves of an endless chain, hooks attached to the said chain for carrying the load and means whereby the hooks, before they pass around the upper sheave will be turned so as to run on the inner circumference of the said upper sheave.

4,979 of 1902.—H. BROOKFIELD: *Water Waste Preventers for Flushing Purposes.*

This consists in the arrangement of a small air or siphon pipe, leading from the crown of the siphon into and in combination with a small, open-topped, vertical cylinder with a closed water-tight end fixed on the bottom of the cistern.

5,545 of 1902.—F. W. BAKER: *Casement Stay and Window-fastener Combined.*

This consists of a grooved and pierced arm or stay, pivotally attached at its one end to a bracket piece and back plate, said arm or stay engaging a fastener consisting of a back plate, a rest and retaining pins, with a spring-governed bolt and finger-piece, all operating together to secure the casement or window in a closed or open or half open position.

5,589 of 1902.—W. DEFRIES and V. I. FEENY: *Hinges.*

A butt hinge, consisting in providing the knuckles with inserted wearing surfaces, such as truncated cones or ball and socket-meeting faces fitting one over the other.

6,016 of 1902.—THE BRITISH URALITE CO., LTD., and J. H. FRISWELL: *Manufacture of Flexible Fire Resisting Material.*

The manufacture of flexible fire resisting material, wherein a pulp prepared of finely-divided asbestos, with or without a filling material, is formed into sheets which are treated with a solution containing an alkaline silicate and a substance capable of decomposing the said alkaline silicate, the said solution being of such strength as to leave in the sheets from 3 to 7 per cent. of silica, whereupon the product is dried at a temperature of about 105 deg. C., and if desired, suitably treated to remove the bye-products resulting from the decomposition of the said alkaline silicate.

6,208 of 1902.—M. J. QUINN and T. F. MCMAHON: *Automatic Flushing Apparatus.*

Automatic flushing apparatus, consisting of a discharge pipe, and a float valve normally closing the said pipe, in combination with a float adapted to raise the said valve when lifted by water flowing into the tank, locking mechanism adapted to hold down the said valve and means for tripping the locking mechanism to release the float.

6,879 of 1902.—G. C. MARKS (W. H. Cook): *Door Checks.*

This consists in the combination, with a sliding door, of a checking device consisting of a bolt provided with an elastic cushion at one end, and supported in the path of movement of the door in position, to be struck thereby when the door has partially completed its opening movement, a strap surrounding the said bolt, and means for varying the pressure of the said strap upon the bolt.

* All these applications are in the stage in which opposition to the grant of a Patent upon them can be made.

8,047 of 1902.—W. WILLIAMS: *Chimney Cowls.*

A device for use with a chimney cowl for causing an up-draught therein, consisting of a fan adapted to revolve therein at or near the mouth thereof in combination with a fan adapted to revolve outside the chimney or cowl, and to be driven by the wind or other means, and connected to the first mentioned fan.

9,348 of 1902.—S. BARRACLOUGH and D. PRIESTLEY: *Removable Refuse Traps, Dirt Collectors for Sinks, Lavatories, Baths, Dye Vats, and the Like.*

This invention relales to removable refuse traps and dirt collectors for sinks, lavatories, baths, dye vats, and the like, and consists of a hollow tapered tube, provided with a hinged grid or perforated cover, and within such tube is a second removable and self-adjusting grid, preferably in the form of a box or chamber perforated at the top and bottom, the perforations in the bottom being preferably smaller than those in the top, so that dirt or refuse passing through the hinged grid, will be retained within the hollow box, which can be lifted out or removed for cleaning purposes.

9,557 of 1902.—A. NEWMAN: *A Flushing Rim Urinal for Women's Use.*

A basin of special shape and to be fixed in a special position for use as a urinal for women, particularly in public "free" lavatories.

12,355 of 1902.—J. BURTON and W. BURTON: *Pottery Kilns and Ovens.*

A pottery oven or kiln constructed with a central chimney connected internally only with bottom flues placed below the floor, a number of bottom flues rotating from the central chimney with apertures opening through the floor into the kiln, and a number of branch flues connecting the bottom flues together, and also connecting the fire mouths with the bottom flues and with the central chimney, which can be opened or closed as required.

21,287 of 1902.—W. HARRISON: *Chimney Tops.*

A chimney top comprising a plurality of sections or parts mounted one above the other and consisting of a lower vertical section resting on and secured to the chimney or stack, a second section secured to said lower section, and consisting of domed, tapering, and vertical portions, and two or more upper vertical sections, the lowermost extending over the second section and connected thereto so as to leave an annular space between their walls, said upper sections extending into or over one another and being so connected together and spaced as also to leave annular spaces between their respective inner and outer walls.

4,824 of 1902.—J. W. T. BRAIN and M. J. MCNAMARA: *Water Closet and Similar Flushing Cisterns.*

This consists in the use of a floating bell as a water displacer for starting the siphonic action, the said bell being arranged to surround and enclose the stand pipe of the cistern and being so constructed that within it is provided an air-space to which the water in the cistern has access, and within which air is trapped to render the said bell buoyant and easy of depression.

21,568 of 1902.—H. H. LAKE (Peck Bros. Co.): *Wash Basins.*

This consists in the combination with a wash basin of a waste plug, an operating head therefore, a waste pipe-head formed with an inclined bearing sleeve, a hub located in the said sleeve, two operating pins carried by the hub and co-acting with the said operating head to lift the plug, a stop pin or projection carried by the hub, and two stop shoulders located within the said sleeve for co-action with the said pin or projection which prevents the hub from more than a quarter turn in either direction, whereby the pins are alternately brought into operation for lifting the plug above its seat.

24,822 of 1902.—J. EVANS: *Apparatus and Appliances to Prevent Down Draughts in Chimneys.*

A method of constructing a wind screen or guard to envelop or surround the top of a chimney, the sectional area of each guard to be made of certain dimensions in relation to each chimney top to which it is to be fitted.

5,118 of 1902.—J. G. MAARDT: *Insulating Material.*

A material suitable for insulating purposes made from cork dust, cork waste, peat dust, small peat, or like material, by saturating same with water glass, pouring the resulting mass into moulds, and finally hardening it by boiling in a solution of chloride of salt or salts.

5,140 of 1902.—C. H. THOMPSON and THE CRYSTALLINE CO., LTD.: *Manufacture of Glass Tiles and Glass for Decorative Glazing and other purposes.*

The manufacture of wavy, undulating, or rippled glass tiles or glass in sheets consisting in placing the glass tile or sheet upon a bed, formed or provided with projecting points or irregularities so that the glass tile or sheet is supported at a number of points, and then subjecting it to heat so that the glass tile or sheet will collapse at the unsupported parts.

5,866 of 1902.—J. G. STIDDER: *Method of Making and Constructing Opal, Glass, or other Tile Partitions.*

In one modification of this invention tiles are made having two or more dovetailed projections on the back of and in one piece with the tile. These tiles are firmly secured back to back with a locking key of cement surrounding the dovetailed projections on the backs of the tiles.

In another modification of this invention slabs are made of cement or other material having dovetailed holes or openings at the back and extending through the thickness of the cement slab. Cement bonding blocks are provided having a hole through the centre of equal diameter to the small hole of the dovetailed opening in the slab. Cement bonding rods are also provided which may be strengthened when necessary with a rod of iron extending from end to end of the said cement bonding rod.

6,130 of 1902.—G. DIETRICH and W. DIETRICH: *Manufacture of Mosaic Plates or Structures.*

A machine for use in manufacturing mosaic plates or structures, the blocks of which are connected together by metal keys or strips, comprising a reciprocating carrier for bringing a securing strip or key into position before the longitudinal grooved edge of the previously formed row of blocks, a device for pressing the strip into the groove, and a pressure actuated cross bar adaped to feed the next row of grooved blocks against the previous row, whereby the metal strip secures the two rows together. The invention further relates to a mosaic plate or structure formed of a number of blocks of wood or other material, provided on at least two parallel sides with lateral grooves, in which metal strips or keys are inserted to hold the adjacent rows of blocks together.

6,378 of 1902.—G. P. WALLIS: *Steam Chambers for Production of Artificial Stone.*

A steam chamber for the production of artificial stone, consisting in the use of a cover for closing the end thereof, in combination with a jointed ring projecting inwardly through the periphery of the chamber and having slots therein for the passage of the cover to the interior of the chamber.

16,704 of 1902.—J. T. SIMPSON and M. N. SHOEMAKER: *Fire Proof Partition Structures.*

This consists in the combination with upright main supporting bars, and diagonal bracing and binding members, passing across and attached to the same, of metal clips secured between the bars, and ceiling or floor materials to secure and change the direction of the diagonal members, and metallic fabric or body secured thereto and against which the plaster is applied so as to embed and protect all parts of the metal frame against fire and securely hold the plaster or plastic material.

MEETINGS.

FRIDAY, FEBRUARY 27.

Institution of Civil Engineers (Students' Meeting).—Mr. E. Falk on "The Relative Advantages of Single Screws, Twin Screws, and Triple Screws for Marine Propulsion." 8 p.m.

SATURDAY, FEBRUARY 28.

Builders' Foremen and Clerks of Works' Institution.—Annual Dinner, King's Hall, Holborn Restaurant. 6 p.m.

Royal Institution.—Rt. Hon. Lord Rayleigh, M.A., F.R.S., on "Light; its Origin and Nature." I. 3 p.m.

Builders' Foremen's Association (Memorial Hall, Farringdon-street).—Mr. A. S. E. Ackermann on "Sanitary Arrangements and Testing." 8.15 p.m.

Edinburgh Architectural Association.—Visit to the Usher Institute of Public Health.

MONDAY, MARCH 2.

Royal Institute of British Architects. — (1) Special general meeting to elect the Royal Gold Medallist for the current year. The Chairman to move—"That, subject to His Majesty's gracious sanction, the Royal Gold Medal for the promotion of architecture be presented this year to Mr. C. F. McKim, of New York, U.S.A., for his executed works as an architect." (2) Ninth general meeting (business) to elect candidates for membership. (3) Discussion of the London Building Acts Amendment Bill which is being promoted by the London County Council. 8 p.m.

Liverpool Architectural Society.—Mr. S. K. Greenslade on "Libraries in America." Lantern views. 6 p.m.

Society of Engineers.—A Topical Discussion on "Road Traffic in and near Large Cities," to be opened by Mr. W. Worby Beaumont, Past-President. 7.30 p.m.

Society of Arts (Cantor Lectures). — Prof. J. A. Fleming, M.A., D.Sc., F.R.S., on "Hertzian Wave Telegraphy in Theory and Practice."—I. 8 p.m.

TUESDAY, MARCH 3.

Royal Institution.—Sir William Abney on "Recent Advances in Photographic Science." II. 3 p.m.

Institution of Civil Engineers.—Paper to be further discussed—"Mechanical Handling of Material," by Mr. G. F. Zimmer. 8 p.m.

Institute of Builders.—Special Finance Committee, 3 p.m.; Parliamentary Committee, 3.30 p.m.; Council Meeting, 4 p.m.

Glasgow Architectural Association.—Mr. A. Wright on "Italian Architecture." 8 p.m.

WEDNESDAY, MARCH 4.

British Archæological Association.—Dr. Phené, F.S.A., on "Similarity of Hill and Rock Cuttings in Greece, Africa, Italy, and Britain." 8 p.m.

Royal Archæological Institute. — Viscount Dillon, P.S.A., on "Armour." 4 p.m.

Society of Arts.—Mr. J. C. Medd on "Education in Holland." 8 p.m.

Edinburgh Architectural Association. — Mr. J. Gillespie on "Towers and Steeples," Illustrated by Limelight Views and Drawings. 8 p.m.

Institute of Sanitary Engineers, Ltd. — Special Council Meeting. 7 p.m.

Dover Institute.—Sir William Preece, K.C.B., on "Imperial and International Communication." Illustrated. 8 p.m.

St. Paul's Ecclesiological Society.—Lantern exhibition of a number of views of churches, crosses, tombs, and other objects of Ecclesiological interest, from photographs taken in Ireland, Sussex, Nottinghamshire, &c., with brief descriptions by Mr. R. Garraway Rice, F.S.A. 8 p.m.

Institution of Civil Engineers.—Students' visit to inspect the widening operations in progress on the London, Brighton, and South Coast Railway, between Victoria Station and Clapham Junction. Assemble at Grosvenor-road Station. Train from Victoria, 2.22 p.m.

THURSDAY, MARCH 5.

Carpenters' Hall, London-wall (Free Lectures on Matters Connected with Building).—Mr. J. A. Gotch, F.S.A., on "Modern Furniture, Movable and Fixed." 8 p.m.

Architectural Association of Ireland.—Demonstration by Mr. W. Baird on House Drainage, Plumbing, &c., at 12, Lower Abbey-street, Dublin. 4 p.m.

London Master Builders' Association. — Special Finance Committee. 3 p.m.

FRIDAY, MARCH 6.

Architectural Association.—Mr. H. B. Creswell and Mr. A. W. S. Cross on "Competitions." 7.30 p.m.

Institution of Junior Engineers.—Mr. W. T. George on "The Use and Maintenance of Electric Motors for Factory Purposes." 8 p.m.

Birmingham Architectural Association.—Mr. E. Guy Dawber on "The Evolution of Chairs."

SATURDAY, MARCH 7.

Royal Institution.—Right Hon. Lord Rayleigh on "Light: its Origin and Nature." II. 3 p.m.

British Institute of Certified Carpenters (Carpenters' Hall.—6 p.m.

SOME RECENT SALES OF PROPERTY:

ESTATE EXCHANGE REPORT.

February 16.—By DOWSETT, KNIGHT, & Co.

Hampstead.—11, College-ter., u.t. 50 yrs., g.r. 10*l.*, p. £2,400

By GILLOWS.

Hyde Park.—14, Sussex-gdns., u.t. 46½ yrs., g.r. 25*l.*, p. 2,000

By CECIL HOBDAY.

Putney.—20, Dealtry-rd., f., p. 1,270

41, Montserrat-rd., u.t. 75½ yrs., g.r. 12*l.*, p. .. 925

By THURGOOD & MARTIN.

Paddington.—13, Cambridge-ter., y.r. 110*l.*; also i.g.r. 6*l.* 6s., u.t. 26 yrs., g.r. 16*l.* 16s. 1,010

Chiswick.—2 and 4, Blandford-rd., u.t. 77½ yrs., g.r. 16*l.* 16s., y.r. 76*l.* 600

Hammersmith.—Fulham Palace-rd., Brandenburgh Cottage, f., p. 2,525

Lochaline-st., three blocks of freehold building land 2,010

Parfrey-st., three blocks of freehold building land 2,035

Parfrey-st., six blocks of freehold building land 4,040

By WEATHERALL & GREEN.

Islington.—Barnsbury-st., c.g.r.'s 68*l.*, reversion in 21 yrs. 2,300

Regent-st.—No. 219, i.g.r. 152*l.*, u.t. 17½ yrs., g.r. 8*l.* 925

Kilburn.—Granville-rd., f.g.r.'s 51*l.* 9s., reversion in 59½ yrs. 1,280

February 17.—By DEBENHAM, TEWSON, & Co.

Fulham.—Rigault-rd., The New Burlington Troy Laundry, area 12,750 ft., f., with goodwill, plant, &c. (as a going concern) 5,500

50, Purser's Cross-rd., u.t. 85½ yrs., g.r. 5*l.*, y.r. 38*l.* 400

Battersea.—Harroway-rd., Harroway Works (factory) area 4,450 ft., f., p. 4,400

46, Harroway-rd., f., w.r. 27*l.* 6s. 360

By HOOKER & WEBB.

City of London.—St. Martin's-le-Grand. The Raglan p.-h., area 2,700 ft., a freehold rental of 375*l.*, reversion in 44 yrs. 11,000

February 18.—By J. H. LYNCH.

Clapham Common.—25, The Pavement (S), f., y.r. 115*l.* 1,850

By RUSHWORTH & STEVENS.

New Bond-street.—Nos. 161 and 162 (one-thirtieth share of business premises), area 5,600 ft. Corporation lease, g.r. 18*l.*, fine 90*l.*, y.r. 1,385*l.* .. 910

Stroud Green.—40, Stapleton Hall-rd., u.t. 72 yrs., g.r. 10*l.* 10s., p. 525

By WOODS & SNELLING.

Fulham.—1 to 4, Hawksmoor-st., u.t. 76 yrs., g.r. 22*l.*, w.r. 156*l.* 990

By J. CARTER JONAS (at Cambridge).

Cambridge.—Gresham-rd., Lindisfarne, u.t. 91 yrs., g.r. 16*l.* 4s., p. 2,600

4, Dorset-ter., u.t. 60 yrs., g.r. 4*l.*, y.r. 60*l.* 680

By DAVID BURNETT & Co. (at Southampton).

Southampton.—Portswood-rd, a corner block of freehold building land 800

By JAMES ELEV (at Boston).

Brothertoft (Lincs.).—Freehold farmhouse and 112 a. 2 r. 3p. 3,700

February 19.—By H. J. BLISS & SONS.

Tottenham.—Church-rd., f.g.r. 18*l.*, reversion in 67 yrs. 420

Sydenham.—2 and 13, Linden Gr., u.t. 79 yrs., g.r. 10*l.*, y.r. 56*l.* 555

By NEWBON, EDWARDS, & SHEPHARD.

Westminster.—43, 45, and 47, Great Peter-st, and 2 and 3, Blue Anchor-court, area 3,600 ft., f., w.r. 201*l.* 10s. 2,650

Putney.—106 and 108, High-st. (S), f., y.r. 150*l.* .. 4,325

Commercial-road East.—76, Back Church-lane, 1, 3, and 5, Everard-st., and 2, 4, and 6, Boyd-st., area 1,790 ft., f., w.r. 127*l.* 8s. 1,530

Highbury.—34 to 40 (even), Conewood-st., u.t. 77 yrs., g.r. 25*l.* 4s., w.r. 166*l.* 8s. 1,140

Barnsbury.—2, Lonsdale-sq., u.t. 6 yrs., g.r., &c., 3*l.* 10s., e.r. 54*l.* 100

Holloway.—16 to 22 (even), Giesbach-rd., u.t. 27½ yrs., g.r. 22*l.*, w.r. 171*l.* 12s. 1,495

Hackney.—241, 243, and 247, Dalston-lane, u.t. 36 yrs., g.r. 18*l.* 7s. 6d., y.r. 126*l.* 1,010

By G. TROLLOPE & SONS.

Chelsea.—Sloane-st., i.g.r. 90*l.*, u.t. 64½ yrs., g.r. 83*l.* 6s. 8d. 150

South Kensington.—136, Lexham-gdns., u.t. 67¾ yrs., g.r. 8*l.*, y.r. 110*l.* 1,000

Ealing.—38, Eaton-rise, f., y.r. 90*l.* £1,480

37, 39, 41, and 43, Eaton-rise, f., y.r. 260*l.* 3,810

By WM. WESTON.

Notting Hill.—Arundel-gdns., freehold rent charges of 52*l.*, subject to an annual payment of 30*l.* 300

By H. J. BROMLEY (at Catford).

Catford.—83, Farley-rd., u.t. 95 yrs., g.r. 10*l.*, p. 52 to 62 (even), Davenport-rd., u.t. 92 yrs., g.r. 30*l.*, w.r. 174*l.* 1,595

February 20.—By A. J. SHEFFIELD.

Limehouse.—11, Clemence-st., u.t. 57 yrs., g.r. 4*l.*, w.r. 46*l.* 16s. 355

Canning Town.—127, Barking-rd. (S), u.t. 78 yrs., g.r. 10*l.*, y.r. 52*l.* 500

Upton Park.—3, Waterloo-rd., u.t. 81 yrs., g.r. 3*l.* 5s., w.r. 23*l.* 8s. 180

By C. H. & J. W. WILLMOTT.

Shepherd's Bush.—12 and 18, Warbeck-rd., f., y.r. 82*l.* 1,300

Contractions used in these lists.—F.g.r. for freehold ground-rent; l.g.r. for leasehold ground-rent; i.g.r. for improved ground-rent; g.r. for ground-rent; r. for rent; f. for freehold; c. for copyhold; l. for leasehold; p. for possession; e.r. for estimated rental; w.r. for weekly rental; q.r. for quarterly rental; y.r. for yearly rental; u.t. for unexpired term; p.a. for per annum; yrs. for years; la. for lane; st. for street; rd. for road; sq. for square; pl. for place; ter. for terrace; cres. for crescent; av. for avenue; gdns. for gardens; yd. for yard; gr. for grove; b.h. for beer-house; p.h. for public-house; o. for offices; s. for shops.

PRICES CURRENT OF MATERIALS.

*** Our aim in this list is to give, as far as possible, the *average* prices of materials, not necessarily the lowest. Quality and quantity obviously affect prices—a fact which should be remembered by those who make use of this information.

BRICKS, &c.

	£ s. d.	
Hard Stocks	1 14 0	per 1,000 alongside, in river.
Rough Stocks and Grizzles.....	1 11 0	,, ,, ,,
Facing Stocks.....	2 12 0	,, ,, ,,
Shippers	2 5 0	,, ,, ,,
Flettons	1 7 6	,, at railway depôt
Red Wire Cuts ..	1 12 0	,, ,, ,,
Best Fareham Red	3 12 0	,, ,, ,,
Best Red Pressed Ruabon Facing	5 0 0	,, ,, ,,
Best Blue Pressed Staffordshire ..	4 5 0	,, ,, ,,
Do. Bullnose	4 11 0	,, ,, ,,
Best Stourbridge Fire Bricks	4 8 0	,, ,, ,,
GLAZED BRICKS.		
Best White and Ivory Glazed Stretchers.....	13 0 0	,, ,, ,,
Headers	12 0 0	,, ,, ,,
Quoins, Bullnose, and Flats.....	17 0 0	,, ,, ,,
Double Stretchers	19 0 0	,, ,, ,,
Double Headers..	16 0 0	,, ,, ,,
One Side and two Ends.....	19 0 0	,, ,, ,,
Two Sides and one End	20 0 0	,, ,, ,,
Splays, Chamfered, Squints	20 0 0	,, ,, ,,
Best Dipped Salt Glazed Stretchers and Headers	12 0 0	,, ,, ,,
Quoins, Bullnose, and Flats.....	14 0 0	,, ,, ,,
Double Stretchers	15 0 0	,, ,, ,,
Double Headers..	14 0 0	,, ,, ,,
One Side and two Ends.....	15 0 0	,, ,, ,,
Two Sides and one End	15 0 0	,, ,, ,,
Splays Chamfered, Squints.....	14 0 0	,, ,, ,,
Second Quality White and Dipped Salt Glazed	2 0 0	,, less than best.
Thames and Pit Sand	7 0	per yard, delivered.
Thames Ballast	6 0	,, ,,
Best Portland Cement	30 0	per ton, delivered.
Best Ground Blue Lias Lime..	21 0	,, ,,

NOTE.—The cement or lime is exclusive of the ordinary charge for sacks.

Grey Stone Lime	10s. 6d. per yard, delivered.
Stourbridge Fire-clay in sacks	27s. 6d. per ton at rly. dpt.

STONE.

	s. d.	
Ancaster in blocks	1 11	per ft. cube, deld. rly. depôt.
Bath ,, ...	1 7	,, ,,
Farleigh Down Bath ..	1 8	,, ,,
Beer in blocks	1 6	,, ,,
Grinshill ,, ...	1 10	,, ,,
Brown Portland in blocks	2 2	,, ,,
Darley Dale in blocks..	2 4	,, ,,
Red Corsehill ,,	2 5	,, ,,
Closeburn Red Freestone	2 0	,, ,,
Red Mansfield ,,	2 4	,, ,,

YORK STONE—*Robin Hood Quality.*

	s. d.	
Scappled random blocks	2 10	per ft. cube, deld. rly. depôt.
6 in. sawn two sides landings to sizes (under 40 ft. super.)	2 3	per foot super. ,,
6 in. Rubbed two sides Ditto, Ditto	2 6	,, ,,
3 in. Sawn two sides slabs (random sizes)..	0 11½	,, ,,
2 in. to 2½ in. Sawn one side slabs (random sizes)	0 7½	,, ,,
1½ in. to 2 in. ditto, ditto	0 6	,, ,,
BEST HARL YORK—		
Scappled random blocks	3 0	per ft. cube ,,
6 in. sawn two sides, landings to sizes (under 40 ft. sup.)	2 8	per ft. super. ,,
6 in. Rubbed two sides Ditto	—	,, ,,

PRICES CURRENT (*Continued*).

STONE.

	s. d.	
3 in. sawn two sides slabs (random sizes)	1 2	per ft. super dld. rly. depot.
2 in. self-faced random flags.....	0 5	,, ,,
Hopton Wood (Hard Bed) in blocks	2 3	per ft. cube.
,, ,, ,, 6 in. sawn both sides landings	2 7	per ft. super. deld. rly. depôt.
,, ,, ,, 3 in. do.	1 2½	,, ,,

SLATES.

in. in.	£ s. d.	
20×10 best blue Bangor..	13 2 6	per 1000 of 1200 at ry. dep.
20×12 ,, ,, ,, ..	13 17 6	,, ,,
20×10 best seconds ,,	12 15 0	,, ,,
20×12 ,, ,, ,,	13 10 0	,, ,,
16×8 best ,,	7 0 0	,, ,,
20×10 best blue Portmadoc	12 5 0	,, ,,
16×8 best blue Portmadoc	6 0 0	,, ,,
20×10 best Eureka unfading green....	15 0 0	,, ,,
20×12 ,, ,,	16 10 0	,, ,,
18×10 ,, ,,	11 10 0	,, ,,
16×8 ,, ,,	8 7 6	,, ,,
20×10 permanent green	10 10 0	,, ,,
18×10 ,, ,,	9 0 0	,, ,,
16×8 ,, ,,	6 5 0	,, ,,

TILES.

	s. d.	
Best plain red roofing tiles..	42 0	per 1,000, at rly. depôt.
Hip and valley tiles....	3 7	per doz. ,, ,,
Best Broseley tiles	50 0	per 1,000 ,, ,,
Do. Ornamental Tiles	52 6	,, ,, ,,
Hip and valley tiles....	4 0	per doz. ,, ,,
Best Ruabon Red, brown or brindled Do. (Edwards)	57 6	per 1,000 ,, ,,
Do. ornamental Do.	60 0	,, ,, ,,
Hip tiles	4 0	per doz. ,, ,,
Valley tiles.....	3 0	,, ,, ,,
Best Red or Mottled Staffordshire Do. (Peakes)	51 9	per 1,000 ,, ,,
Do. Ornamental Do.	54 6	,, ,, ,,
Hip tiles	4 1	per doz. ,, ,,
Valley tiles.....	3 8	,, ,, ,,
Best "Rosemary" brand plain tiles 48	0	per 1,000 ,, ,,
Do. Ornamental Do. 50	0	,, ,, ,,
Hip tiles	4 0	per doz. ,, ,,
Valley tiles	3 8	,, ,, ,,

WOOD.

	At per standard.			
Deals: best 7 in. by 11 in. and 4 in. by 9 in and 11 in.....	£ 15	s. d. 10 0	£ 16	s. d. 10 0
Deals: best 3 by 9.....	14	10 0	15	10 0
Battens: best 2½ in. by 7 in. and 8 in., and 3 in. by 7 in. and 8 in.....	11	10 0	12	10 0
Battens: best 2½ by 6 and 3 by 6 ..	0	10 0	less than 7 in. and 8 in.	
Deals: seconds	1	0 0	less than best	
Battens: seconds	0	10 0	,, ,, ,,	
2 in. by 4 in. and 2 in. by 6 in. ..	9	0 0	9	10 0
2 in. by 4½ in. and 2 in. by 7 in. ..	8	10 0	9	10 0
Foreign Sawn Boards—				
1 in. and 1¼ in. by 7 in.	0	10 0	more than battens.	
¾ in.	1	0 0	,,	
Fir timber: Best middling Danzig or Memel (average specification	At per load of 50 ft. 4 10 0		5 0 0	
Seconds	4	5 0	4	10 0
Small timber (8 in. to 10 in.)	3	12 6	3	15 0
Small timber (6 in. to 8 in.).....	3	0 0	3	10 0
Swedish balks	2	15 0	3	0 0
Pitch-pine timber (30 ft. average)..	3	5 0	3	15 0
JOINERS' WOOD.	At per standard.			
White Sea: First yellow deals, 3 in. by 11 in.....	23	0 0	24	0 0
3 in. by 9 in.	21	0 0	22	10 0
Battens, 2½ in. and 3 in. by 7 in.	17	0 0	18	10 0
Second yellow deals, 3 in. by 11 in.	18	10 0	20	0 0
,, ,, 3 in. by 9 in.	17	10 0	19	0 0
Battens, 2½ in. and 3 in. by 7 in.	13	10 0	14	10 0
Third yellow deals, 3 in. by 11 in. and 9 in.	15	10 0	16	10 0
Battens, 2½ in. and 3 in. by 7 in.	11	10 0	12	10 0
Petersburg: first yellow deals, 3 in. by 11 in.	21	0 0	22	10 0
Do. 3 in. by 9 in.....	18	0 0	19	10 0
Battens.....	13	10 0	15	0 0
Second yellow deals, 3 in. by 11 in.....	16	0 0	17	0 0
Do. 3 in. by 9 in.	14	10 0	16	0 0
Battens.....	11	10 0	12	10 0
Third yellow deals, 3 in. by 11 in.	13	10 0	14	0 0
Do. 3 in. by 9 in.	13	0 0	14	0 0
Battens	10	0 0	11	0 0
White Sea and Petersburg:—				
First white deals, 3 in. by 11 in.	14	10 0	15	10 0
,, ,, 3 in. by 9 in.	13	10 0	14	10 0
Battens.....	11	0 0	12	0 0
Second white deals 3 in. by 11 in.	13	10 0	14	10 0
,, ,, ,, 3 in. by 9 in.	12	10 0	13	10 0
,, ,, ,, battens.....	9	10 0	10	10 0
Pitch-pine: deals	16	0 0	18	0 0
Under 2 in. thick extra	0	10 0	1	0 0
Yellow Pine—First, regular sizes ..	33	0 0	upwards.	
Oddments	22	0 0	24	0 0
Seconds, regular sizes	24	10 0	26	10 0
Yellow Pine Oddments	20	0 0	22	0 0
Kauri Pine—Planks, per ft. cube..	0	3 6	0	4 6
Danzig and Stettin Oak Logs—				
Large, per ft. cube	0	2 6	0	3 6
Small ,, ,, ...	0	2 3	0	2 6
Wainscot Oak Logs, per ft. cube ..	0	5 0	0	5 6
Dry Wainscot Oak, per ft. sup. as inch	0	0 7	0	0 8
¾ in. do. do.	0	0 6½	-	- -
Dry Mahogany—				
Honduras, Tabasco, per ft. sup. as inch	0	0 9	0	0 11
Selected, Figury, per ft. sup. as inch	0	1 6	0	2 0
Dry Walnut, American, per ft. sup. as inch	0	0 10	0	1 0
Teak, per load	16	10 0	20	0 0
American Whitewood Planks—				
Per ft. cube	0	4 0	-	- -

[*See also page 239.*

COMPETITIONS, CONTRACTS, AND PUBLIC APPOINTMENTS.

(For some Contracts, &c., still open, but not included in this List, see previous issues.)

COMPETITIONS.

Nature of Work.	By whom Required.	Premiums.	Designs to be delivered
*Town Hall and Municipal Buildings	Chepping Wycombe Corporation ...	105*l.* and 26*l.* 5*s.*	April 4

CONTRACTS.

Nature of Work or Materials.	By whom Advertised.	Forms of Tender, &c., supplied by	Tenders to be delivered
Street Works, Ely, Cardiff	Llandaff and Dinas Powis R.D.C. ...	J Holden, Civil Engineer, 35, St. Mary-street, Cardiff	Mar. 3
Schools, Woodgate, near Loughborough, Leics.	.....	Barrowcliff & Allcock, Architects, Loughborough	do.
Chapel, Legrams-lane, Bradford	.....	Abm. Sharp, Architect, Market-street, Bradford	do.
Schools, Horton Grange-road, Bradford	.....	do	do.
Additions to Church, Dalston, Cumberland	United Methodists	H. H. Hodgkinson, Architect, 9, Lowther-street, Carlisle	do.
Broken Granite	Milton-next-Sittingbourne U.D.C...	W. R. Warlow, Town Hall, Sittingbourne	do.
Granite Dross, &c.	Thorne (Yorks) R.D.C.	The Clerk, Council Offices, Thorne	do.
Paving, &c., Cark and other Roads...	Keighley Corporation	W. H. Hopkinson, Civil Engineer, Town Hall, Keighley	do.
Road Works and Materials	Bath Town Council	C. R. Fortune, City Surveyor, Bath	do.
Shed at Sanitary Depot, Queen's Head-road	Handsworth U.D.C.	H. Richardson, Civil Engineer, Handsworth	do.
Car Shed, Workshops, &c.	Darlington Corporation	Borough Surveyor, Town Hall, Darlington	do.
Water Supply Works, Aldourie Castle, Inverness	.....	G. Gordon & Co., Civil Engineers, Inverness	do.
Kerbing, &c., Bentley-road	Doncaster R.D.C.	W. R. Crabtree, Surveyor, High-street, Doncaster	Mar. 4
Additions to Garth Schools	Maesteg School Board	E. W. Burnett & Sons, Architects, Jarrow House, Tondu	do.
Four Villas, Helen's Bay, Belfast	Mr. J. V. M'Entire	J. C. Lindsay, Architect, 1, Glengall-place, Belfast	do.
Road Metal, &c., Ponteland, Northumberland	Castle Ward R.D.C.	D. Hope, Surveyor, Ponteland	do.
Offices, &c., Moor Fair Ground	Bradford Corporation	City Architect, Brewery-street, Bradford	do.
Granite Road Metal	Croydon R.D.C.	E. J. Gowen, Town Hall, Croydon	do.
House, Howgate Wood-road, Slaithwaite	.....	J. E. Lunn, Architect, Milnsbridge	do.
Road Materials	Northampton R.D.C.	W. Tomalin, 14, Guildhall-road, Northampton	do.
Five Shops and Houses, Cavendish-street, Keighley	.....	B. Hopkinson & Co., Architects, Craven Bank Chambers, Keighley	do.
Granite Setts (2,068 tons)	Ipswich Corporation	E. Buckham, Borough Surveyor, Town Hall, Keighley	do.
Road Works, Brisco Estate	Hastings Corporation	P. H. Palmer, Civil Engineer, Town Hall, Hastings	do.
Two Houses, High-street, Wroughton, Wilts	Mr. W. J. Tibbles	W. Drew & Sons, Architects, 28, Regent-circus, Swindon	do.
Underground Convenience The Green, nr. Esplanade...	Littlehampton U.D.C.	H. Howard, Surveyor, Town Hall, Littlehampton	do.
Gasholder Tank, Lower Bristol-street	Bath Gas Co.	C. S. Ellery, Engineer, Gasworks, Bath	do.
Stone (1,000 tons) Penryn, Cornwall	East Kerrier R.D.C.	J. H. Chubb, Surveyor, Belmont, Penryn	do.
Cleaning, &c., Grove Hospital, Tooting	Metropolitan Asylums Board	Office of the Board, Embankment, E.C.	do.
Collection and Removal of House Refuse	Hackney Borough Council	Medical Officer of Health, Town Hall, Hackney, N.E.	do.
House, Banff	Mr. G. A. Cumming	C. W. Cosser, Architect, Carmelite-street, Banff	Mar. 5
Relaying Single Drain, 214 lineal yards	Dawlish U.D.C.	Surveyor's Office, Sandringham House, Brunswick-place, Dawlish	do.
House, Pwllheli, Wales	Holyhead and N. Wales Corporation	J. Hunter, Architect, Pwllheli	do.
Drainage Works at Cemetery	Windsor Town Council	Borough Surveyor, Alma-road, Windsor	do.
Sewerage Works, Pocklington, Yorks	.....	Alf. Summerson, Pocklington	do.
Drainage Works, Sea Lawn-terrace	Dawlish U.D.C.	R. Clarke, Civil Engineer, Brunswick-place, Dawlish	do.
Restoration of Church Tower, Bassaleg, Mon.	.....	C. B. Fowler, Architect, High-street, Cardiff	Mar. 6
Setts, Kerbs, &c.	Withington U.D.C.	A. H. Mountain, Engineer, Town Hall, Withington	do.
Road Material	Pontefract R.D.C.	W. A. Glover, Union Offices, Pontefract	do.
Hotel, Horton-street, Halifax	.....	R. Horsfall & Son, Architects, Halifax	do.
Whinstone, &c., Old Hill, Staffs	Rowley Regis U.D.C.	D. Wright, Council Offices, Old Hill, Staffs	do.
Additions to Schools, Barkerend	Bradford School Board	T. Garbutt, School Board Office, Manor-row, Bradford	do.
Surveyor's Materials	Withington (Lancs) U.D.C.	A. H. Mountain, Engineer, Town Hall, Withington	do.
Landing Jetty	Penzance Town Council	F. Latham, Civil Engineer, Public Buildings, Penzance	do.
Church Schools, West Auckland	.....	G. Race, Architect, Westgate, Weardale	Mar. 7
Road Stone, &c.	Worcester County Council	J. H. Garrett, County Surveyor, Town Hall, Worcester	do.
Road Works, America-road	Walton-on-Thames U.D.C.	C. J. Jenkin, Architect, Walton-on-Thames	do.
Surveyor's Materials	Rotherham U.D.C.	R. Bradbury, Surveyor, 29, High-street, Rotherham	do.
Schools, Holland-road	Great Clacton School Board	T. H. Baker, Architect, Station-road, Clacton	do.
Infectious Diseases Hospital	Linlithgow	J. Melvin & Son, Architects, Mar-street, Alloa	do.
Library	Coatbridge (N.B.) Town Council ...	W. Lyle, 6, St. John-street, Coatbridge	do.
Vicarage, Oyslermouth, Wales	.....	E. M. Bruce Vaughan, Architect, Cardiff	do.
Alterations to Fish Market	Accrington Corporation	W. J. Newton, Civil Engineer, Town Hall, Accrington	do.
Kerbing, Setts, &c.	Colchester Corporation	H. Goodyear, Civil Engineer, Town Hall, Colchester	do.
Road Materials	Erpingham R.D.C.	R. Mann, Surveyor, Cromer-road, Holt	do.
Granite Road Metal, &c.	Billesdon (Leics) R.D.C.	W. E. Richardson, 8, New-street, Leicester	do.
Supply of Materials and Execution of Works	Stepney Borough Council	Council's Engineer, 15, Great Alie-street, Whitechapel, E.	do.
Execution of Works and Supply of Materials	St. Marylebone Borough Council ...	Town Hall, St. Marylebone, W.	Mar. 9
Surveyor's Materials, Beccles, Suffolk	Wangford R.D.C.	F. S. Rix, Council Offices, Beccles	do.
Sewers, Hutton, near Shenfield	Billericay (Essex) R.D.C.	S. J. Shelley, Junction-road, Brentwood	do.
Painting, Colouring &c., at Infirmary, Notting Hill	St. Marylebone Guardians	Steward at Infirmary, Rockham-street, Notting Hill	do.
Surveyor's Materials	Folkestone Corporation	A. E. Nichols, Civil Engineer, Town Hall, Folkestone	do.
Weaving Sheds, Marsden, Yorks	Messrs. Crowther & Co.	J. E. Lunn, Architect, Milnsbridge	do.
Alterations to Schools, Abermorlais	Merthyr Tydfil School Board	J. L. Smith, Architect, 50, High-street, Merthyr	do.
Schools near Canterbury	Chartham School Board	G. Smith, Architect, 34, Station-road, Canterbury	do.
Reservoir, Kilbirnie	.....	W. R. Copland, Civil Engineer, 146, West Regent-street, Glasgow	do.
Bridge Works, &c. Kirby, Treleth	Lancashire County Council	County Bridge-Master, Preston	do.
Refuse Destructor, &c., Rockingham-road	Kettering U.DC.	J. Bond, Market-street, Kettering	do.
Alterations to Workhouse	Wisbech Guardians	F. B. Ward, Architect, 7, York-row, Wisbech	do.
Church, Torres, N.B.	.....	J. Robertson, Architect, 39, Union-street, Inverness	do.
Repairs, &c. to Swimming Bath	Kensington Royal Boro' Council ...	Taylor, Sons, & Santo Crimp, 27, Great George-street, S.W.	Mar. 10
Alterations to Public School, Greenhill	Falkirk Parish School Board	J. Strang, Architect, Vicar-street, Falkirk	do.
Additions to Workhouse, Elm Grove	Brighton Guardians	H. S. Reed, Parochial Offices, Brighton	do.
Flints, Gravel, &c.	Faversham R.D.C.	J. G. Cluttenden, Surveyor, Ashford-road, Faversham	do.
Execution of Works and Supply of Materials	Bromley U.D.C.	Council's Offices, Bromley, Kent	do.
Water Supply Works	Hayfield (Derbyshire) R.D.C.	J. R. Bowden, New Mills, Stockport	do.
Road Works, Rolleston-road	Croydon Town Council	Borough Surveyor, Town Hall, Croydon	do.
New Offices at Euston-road	Hearts of Oak Benefit Society	M. C. Meaby, Jessel Chambers, Chancery-lane, W.C.	do.
Electricity Generating Station, Chimney Shaft, &c.	Weymouth & Melcombe Regis Cpn.	Borough Engineer, Weymouth	Mar. 11
Whinstone, &c., West Kilpatrick	Glasgow Corporation	A. Wilson, Surveyor, Alexandria, N.B.	do.
Execution of Works and Supply of Materials	Fulham Borough Council	Council's Offices, Town Hall, Fulham, S.W.	do.
Painting, &c., North Western Fever Hospital	Metropolitan Asylums Board	Office of Board, Embankment, E.C.	do.
Girder and Concrete Floor	Fulham Guardians	Consulting Engineer to the Guardians, 13, Victoria-street, S.W.	do.
Road Materials	Bingham (Notts) R.D.C.	R. H. Beaumont, Market-street, Bingham	do.
Granite, &c.	Bexley U.D.C.	W. T. Howse, Surveyor, Public Hall, Bexley Heath, Kent	do.
Granite Road, Metal, &c. (2,600 tons)	Ely R.D.C.	E. B. Claxton, Downham-lane, Ely	do.
Church, Budleigh Salterton, Devon	.....	W. H. Boney, Architect, 124, Chancery-lane, E.C.	Mar. 12
New Pumping Station Buildings	Alexandra Docks, &c. Co.	Sir John Wolfe Barry, 21, Delahay-street, S.W.	do.
Enlargement of Post Office, at Barnsley	Commissioners of H.M. Works, &c.	H.M. Office of Works, Storey's Gate, S.W.	Mar. 13
Steam Disinfecting Apparatus, &c.	Stroud Joint Hospital Board	G. P. Milnes, Architect, Stroud	Mar. 16
Technical Institute and Refuse Destructor	East Ham U.D.C.	Council's Engineer, Town Hall, East Ham, E.	do.
Making-up and Paving Road	Wandsworth Borough Council	Council House, East Hill, Wandsworth	Mar. 17
Alterations to Arches, Paddington Station	Great Western Railway Co.	Engineer, Paddington Station, W.	do.
Furniture, &c.	County Borough of Croydon	Clerk to the Lunacy Visiting Committee, Town Hall, Croydon	Mar. 18
Demolition of Old Workhouse Premises	Brentford Union	The Clerk, Union Offices, Isleworth, W.	do.
New Post Office, Huntingdon	Commissioners of H.M. Works, &c...	H.M. Office of Works, &c. Storey's Gate, S.W.	do.
Crematorium at City of London Cemetery	Corporation of London	Engineer to Corporation, Guildhall, E.C.	Mar. 24
Infectious Diseases Hospital, Cobham, nr. Gravesend	Strood R.D.C.	E. Godfrey Page, 4 and 5, Warwick-court, Gray's Inn, W.C	Mar. 25
Additional Blocks for 300 Patients	Cotford Asylum Visiting Committee	G. T. Hine & Co., Architects, 35, Parliament-street, S.W.	do.
Sinking a Well	Welwyn R.D.C.	R. E. Middleton, M.I.C.E., 17, Victoria-street, S.W.	Mar. 28
Buildings for Electricity Station and Chimney Shaft	Kettering U.D.C.	Clerk to Council, Market-street, Kettering	No date
House, &c., Thomson-street, Carlisle	Mr. G. Rae	W. & G. Pogson, Architects, Devonshire-street, Carlisle	do.
Warehouse, Cleveland Mills, Thornaby	.....	The Manager, Cleveland Flour Mills, Thornaby-on-Tees	do.
Alterations to Wesleyan Chapel, Scarborough	Bishop of Salisbury	Danby & Simpson, Architects, 10, Park-row, Leeds	do.
School House, Exeter-street, Salisbury		J. Harding & Son, Architects, 58, High-street, Salisbury	do.

[*See also next page.*

CONTRACTS.—*Continued.*

Nature of Works or Materials.	By whom Advertised.	Forms of Tender, &c., supplied by	Tenders to be delivered
Two Houses, Sheffield-road, Barnsley	.....	Crawshaw & Wilkinson, Architects, 13, Regent-street, Barnsley	No date.
Additions to Cotton Mill, Bury, Lancs.	Messrs. S. Renshaw & Sons	Potts, Son, & Hemmings, Architects, St. Georges-road, Bolton	do.
Road Works, Pembury, Kent	.....	T. Dawson, Civil Engineer, 3, Bayhall-road, Tunbridge Wells	do.
Granite Road Metal (7,000 tons)	Abingdon R.D.C.	B. & M. Challenor, 59, Stert-street, Abingdon	do.
Storm-water Drain, Donisthorpe	.....	H. Geeman, Market-street, Ashby-de-la-Zouch	do.
Granite Road Metal	Blaby (Leics) R.D.C.	G. E. Bonskell, 27, Friar-lane, Leicester	do.
*Erection of New Theatre, Colchester	H. Slocombe, Esq.	J. W. Start, Architect, Colchester	do.

PUBLIC APPOINTMENTS.

Nature of Appointment.	By whom Advertised.	Salary.	Application to be in
*Surveyor, Inspector of Nuisances, &c.	Ashborne U.D.C.	170*l.*	Mar. 3
*Architectural Assistant	Southampton County Council	250*l.* &c.	Mar. 10
*Assistant Examiner in H.M. Office of Works	Civil Service Commissioners	Not stated	Mar. 12
*Three Junior Surveyors	London County Council	2*l.* 10*s.*	do.
*Surveyor and Waterworks Engineer	Leek U.D.C.	225*l.*	do.

Those marked with an asterisk (*) are advertised in this Number. *Competitions*, iv. *Contracts*, iv. vi. viii. x. & xix. *Public Appointments*, xvi.

PRICES CURRENT (*Continued*).

WOOD.

Prepared Flooring—	Per square. £ s. d.	£ s. d.
1 in. by 7 in. yellow, planed and shot	0 13 6	0 17 6
1 in. by 7 in. yellow, planed and matched	0 14 0	0 18 0
1¼ in. by 7 in. yellow, planed and matched	0 16 0	1 1 6
1 in. by 7 in. white, planed and shot	0 11 6	0 13 6
1 in. by 7 in. white, planed and matched	0 12 0	0 14 0
1¼ in. by 7 in. white, planed and matched	0 14 6	0 16 6
¾ in. by 7 inch yellow matched and beaded or V-jointed boards	0 11 0	0 13 6
1 in. by 7 in. do. do. do.	0 14 0	0 18 0
¾ in. by 7 in. white do. do.	0 10 0	0 11 6
1 in. by 7 in. do. do. do.	0 11 6	0 13 6

6-in. at 6d. to 9d. per square less than 7-in.

JOISTS, GIRDERS, &c.

	In London, or delivered. £ s. d.	Railway Vans, per ton. £ s. d.
Rolled Steel Joists, ordinary sections	6 5 0	7 5 0
Compound Girders ,, ,,	8 2 6	9 5 0
Angles, Tees and Channels, ordinary sections	7 17 6	8 17 6
Flitch Plates	8 5 0	8 15 0
*Cast Iron Columns and Stanchions, including ordinary patterns	7 2 6	8 5 6

METALS.

	Per ton, in London £ s. d.	£ s. d.
IRON—		
Common Bars	7 15 0	8 5 0
Staffordshire Crown Bars, good merchant quality	8 5 0	8 15 0
Staffordshire "Marked Bars"	10 10 0	- - -
Mild Steel Bars	9 0 0	9 10 0
Hoop Iron, basis price	9 5 0	9 10 0
,, ,, galvanised	16 0 0	- - -
(* And upwards, according to size and gauge.)		
Sheet Iron, Black.—		
Ordinary sizes to 20 g.	10 0 0	- - -
,, ,, to 24 g.	11 0 0	- - -
,, ,, to 26 g.	12 10 0	- - -
Sheet Iron, Galvanised, flat, ordinary quality—		
Ordinary sizes, 6 ft. by 2 ft. to 3 ft. to 20 g.	12 15 0	- - -
,, ,, 22 g. and 24 g.	13 5 0	- - -
,, ,, 26 g.	14 5 0	- - -
Sheet Iron, Galvanised, flat, best quality:—		
Ordinary sizes to 20 g.	16 0 0	- - -
,, ,, 22 g. and 24 g.	16 10 0	- - -
,, ,, 26 g.	18 0 0	- - -
Galvanised Corrugated Sheets :—		
Ordinary sizes, 6 ft. to 8 ft. 20 g.	12 15 0	- - -
,, ,, 22 g. and 24 g.	13 5 0	- - -
,, ,, 26 g.	14 5 0	- - -
Best Soft Steel Sheets, 6 ft. by 2 ft. to 3 ft. by 20 g. and thicker	12 0 0	- - -
,, ,, 22 g. and 24 g.	13 0 0	- - -
,, ,, 26 g.	14 5 0	- - -
Cut nails, 3 in. to 6 in.	9 5 0	9 15 0
(Under 3 in. usual trade extras.)		

LEAD, &c.

	Per ton, in London. £ s. d.	£ s. d.
LEAD—Sheet, English, 3 lbs. & up.	14 7 6	- - -
Pipe in coils	14 17 6	- - -
Soil pipe	17 7 6	- - -
Compo Pipe	17 7 6	- - -
ZINC—Sheet—		
Vieille Montagne ton	25 0 0	- - -
Silesian	24 15 0	- - -
COPPER—		
Strong Sheet per lb.	0 0 10½	- - -
Thin	0 0 11½	- - -
Copper nails ,,	0 0 11½	- - -
BRASS—		
Strong Sheet ,,	0 0 10	- - -
Thin ,,	0 0 11	- - -

PRICES CURRENT (*Continued*).

LEAD, &c.

	Per ton, in London. £ s. d.	£ s. d.
TIN—English Ingots ,,	0 1 4½	- - -
SOLDER—Plumbers' ,,	0 0 6½	- - -
Tinmen's ,,	0 0 8½	- - -
Blowpipe ,,	0 0 9½	- - -

ENGLISH SHEET GLASS IN CRATES.

15 oz. thirds	2½d. per ft. delivered.
,, fourths	1¾d. ,, ,,
21 oz. thirds	3¼d. ,, ,,
,, fourths	2¾d. ,, ,,
26 oz. thirds	4d. ,, ,,
,, fourths	3½d. ,, ,,
32 oz. thirds	5d. ,, ,,
,, fourths	4½d. ,, ,,
Fluted sheet, 15 oz.	3d. ,, ,,
,, 21 oz.	4d. ,, ,,
⅛ Hartley's Rolled Plate	1¾d. ,, ,,
3/16 ,, ,, ,,	2d. ,, ,,
¼ ,, ,, ,,	2¼d. ,, ,,

OILS, &c.

		£ s. d.
Raw Linseed Oil in pipes or barrels	per gallon	0 2 4
,, ,, ,, in drums	,,	0 2 8
Boiled ,, ,, in pipes or barrels	,,	0 2 6
,, ,, ,, in drums	,,	0 2 10
Turpentine, in barrels	,,	0 3 8
,, in drums	,,	0 3 10
Genuine Ground English White Lead	per ton	20 10 0
Red Lead, Dry	,,	20 0 0
Best Linseed Oil Putty	per cwt.	0 8 0
Stockholm Tar	per barrel	1 12 0

VARNISHES, &c.

	Per gallon. £ s. d.
Fine Pale Oak Varnish	0 8 0
Pale Copal Oak	0 10 6
Superfine Pale Elastic Oak	0 12 6
Fine Extra Hard Church Oak	0 10 6
Superfine Hard-drying Oak, for Seats of Churches	0 14 0
Fine Elastic Carriage	0 12 6
Superfine Pale Elastic Carriage	0 16 0
Fine Pale Maple	0 16 0
Finest Pale Durable Copal	0 18 0
Extra Pale French Oil	1 1 0
Eggshell Flatting Varnish	0 18 0
White Copal Enamel	1 4 0
Extra Pale Paper	0 12 0
Best Japan Gold Size	0 10 6
Best Black Japan	0 16 0
Oak and Mahogany Stain	0 9 0
Brunswick Black	0 8 6
Berlin Black	0 16 0
Knotting	0 10 0
French and Brush Polish	0 10 0

TO CORRESPONDENTS.

NOTE.—The responsibility of signed articles, letters, and papers read at meetings rests, of course, with the authors.

We cannot undertake to return rejected communications.

Letters or communications (beyond mere news items) which have been duplicated for other journals are NOT DESIRED.

All communications must be authenticated by the name and address of the sender, whether for publication or not. No notice can be taken of anonymous communications.

We are compelled to decline pointing out books and giving addresses.

Any commission to a contributor to write an article is given subject to the approval of the article, when written, by the Editor, who retains the right to reject it if unsatisfactory. The receipt by the author of a proof of an article in type does not necessarily imply its acceptance.

All communications regarding literary and artistic matters should be addressed to THE EDITOR; those relating to advertisements and other exclusively business matters should be addressed to THE PUBLISHER, and not to the Editor.

TENDERS.

[Communications for insertion under this heading should be addressed to "The Editor," and must reach us *not later than 10 a.m. on Thursdays.* N.B.—We cannot publish Tenders unless authenticated either by the architect or the building-owner; and we cannot publish announcements of Tenders accepted unless the amount of the Tender is given, nor any list in which the lowest Tender is under 100*l.*, unless in some exceptional cases and for special reasons.]

* Denotes *accepted.* † Denotes *provisionally accepted.*

AMMANFORD.—For building an institute for the Ammanford Institute Committee. Mr. David Jenkins, architect, Llandilo:—

Jones Bros., Tirydail, Ammanford* £1,200

AMMANFORD.—For building a cottage for Mr. Thomas Lewis, Brynaraul Ammanford. Mr. David Jenkins, architect, Llandilo:—

J. Davies, Penrhos Joinery Works, Llanelly* £252

BRYNAMMAN.—For building a church at Cwmllyn fell, for the Rev. J. Morlais Jones, vicar, and Rev. T. C Evans, vicar, Cwmllynfell. Mr. David Jenkins, architect, Llandilo:—

Evans & Roberts, Station-road, Brynamman* £1,137 10

FELLING (Durham).—For the erection of an isolation hospital, Windy Nook, for the Urban District Council. Mr. H. Miller, architect, Felling. Quantities by Mr. Geo. Bell, Nunarth:—

J. Wilkinson, Felling* £9,837 7 7

LLANDILO.—For building a conservatory for Mr. J. W. Nicholas, Brynteilo. Mr. David Jenkins, architect, Llandilo:—

J. Davies, Ffairfach, Llandilo (for brick base) £80
B. Jenkins, Brecon (superstructure) 220

LLANDOVERY.—For constructing a cattle and sheep market, for the Corporation. Mr. David Jenkins, architect, Llandilo:—

William D. Morgan, Pencrug, Gwynfe, Llangadock, R.S.O.* £877 10

LLANEGWAD.—For building a memorial tower for Mr. E. H. Bath and the Rev. Evan Thomas, Vicar. Mr. David Jenkins, architect, Llandilo:—

William D. Morgan, Pencrug Gwynfe, Llangadock* £600

LLANFYNYDD.—For building a master's house at Clawddowen Board School, for the Llanfynydd School Board. Mr. David Jenkins, architect, Llandilo:—

Rees Thomas, Froodvale Saw Mills, Llansawel, Llandilo* £320

LLANGADOCK.—For additions to the vicarage, for the Rev. Wm. Rees, R.D., vicar. Mr. David Jenkins, architect, Llandilo:—

Daniel Price, Llangadock* £257

LLANON.—For extension of Tabor Baptist Chapel, for the building committee. Mr. David Jenkins, architect, Llandilo:—

Lewis Davies, Penygroes, Llandebie, R.S.O.* £595

[*See also next page.*

LLANWRDA.—For building a shooting-box at Pumpsaint, for Colonel Methuen. Mr. David Jenkins, architect, Llandilo :—

David Davies, Bryncrach Pumpsaint, Llanwrda, R.S.O.* £1,562 16

LONDON.—For new congregational church, Denmark Hill, London, S.E. Mr. Alfred Conder, architect, Palace-chambers, Westminster :—

	Fences, Gates, &c.	Tower.	Church.	Total.
	£	£	£	£
Staines & Son.....	280	1,470	7,998	9,748
Lascelles & Co.	256	1,285	7,411	8,952
Brown & Sons	248	1,278	7,171	8,697
Bower & Co.*	258	1,296	7,140	8,694
Grover & Son.....	260	1,305	7,075	8,640
L. H. & R. Roberts	250	1,280	7,048	8,578
Colls & Sons	220	1,247	6,960	8,427
Stimpson & Co.....	260	1,200	6,960	8,420
Courtney & Fairbairn	230	1,262	6,907	8,399
Rider & Son	235	1,177	6,828	8,240
Kingerlee & Sons ..	260	1,150	6,677	8,087
McCormick & Sons	218	1,077	6,652	7,947
Akers & Co.	192	1,140	6,491	7,823
Henry Young†	213	1,117	6,447	7,777

† Accepted with modifications.

STREET (Somerset). — For the execution of water-supply works, for the Urban District Council. Mr. A. P. I. Cotterell, C.E., 28, Baldwin-street, Bristol :—

	£	s.	d.	£	s.	d.	£	s.	d.
C. F. Johnson..	—			2,804	15	10	—		
Thos. Jackman.	—			1,761	8	1	—		
H. W. Pollard..	—			—			2,692	0	0
Gleed Bros.....	8,414	0	0	4,235	0	0	3,995	0	0
Wills & Son....	7,523	5	0	4,099	2	6	3,564	13	0
Dart & Pollard.	7,340	0	0	3,189	0	0	2,595	0	0
Cooke & Co. ..	6,959	0	0	3,661	0	0	3,006	0	0
W. & J. Bennett	6,850	0	0	4,300	0	0	2,850	0	0
R. W. Barker ..	6,682	5	2	2,998	11	4	3,911	4	6
J. & T. Binns..	6,620	0	0	3,960	7	10	3,212	0	0
R. Wood	6,412	6	4	2,542	11	8	2,579	8	3
Marshall Lovell	6,214	0	0	3,504	0	0	2,872	0	0
F. Huish	6,060	0	0	3,162	7	8	2,580	0	0
Reid Bros.	6,020	0	0	1,912	15	0	—		
H. Roberts....	6,000	0	0	1,800	0	0	2,800	0	0
Crawford & Son	5,960	0	0	2,000	0	0	3,800	0	0
Lloyd & Son ..	5,851	15	10	2,285	2	11	3,481	12	10
Hole & Roberts	5,587	15	7	3,230	11	2	—		
T. Vale.....	5,450	0	0	1,830	0	0	2,820	0	0
S. Ambrose	5,387	14	1	1,990	0	0	3,381	4	4
Ross & Crabtree	5,250	0	0	1,755	0	0	—		
C. T. Perkins..	5,092	17	8	2,443	17	4	2,952	14	10
Smith & Marchant	4,997	10	0	2,797	10	0	—		
Meredith & Co.	4,446	8	1	2,897	3	3	2,801	17	1
*Wright & Son	4,236	10	9	1,643	6	10	2,543	19	10

FARNHAM.—For the erection of a house at Farnham, Surrey. Messrs. Clare & Ross, architects, 1, West-street, Finsbury Circus, E.C., and Chelmsford. Quantities by Mr. H. M. Messenger, 16, Great George-street, Westminster, S.W. :—

Goddard & Sons....	£1,334	Tompsett & Co.....	£1,168
Harris & Son	1,293	H. Roffey, Putney, S.W.*	1,124
A. G. Mardon	1,260		

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PUBLISHER'S NOTICES.

THE INDEX (with TITLE-PAGE) for VOLUME LXXXIII. (July to December, 1902) was given as a supplement with the number for January 10th.

CLOTH CASES for Binding the Numbers are now ready, price 2s. 6d. each ; also

READING CASES (Cloth), with Strings, price 9d. each.

THE EIGHTY-THIRD VOLUME of "The Builder" (bound) price Twelve Shillings and Sixpence, is NOW READY.

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*** Stamps *must not* be sent, but all sums should be remitted by Postal Orders, payable to J. MORGAN, and addressed to the Publisher of "THE BUILDER," Catherine-street, W.C.

Advertisements for the current week's issue are received up to THREE o'clock p.m. on THURSDAY, but "Classification" is impossible in the case of any which may reach the Office after HALF-PAST ONE p.m. on that day. Those intended for the Outside Wrapper should be in by TWELVE noon on WEDNESDAY.

ALTERATIONS IN STANDING ADVERTISEMENTS or ORDERS TO DISCONTINUE same must reach the Office before TEN o'clock on WEDNESDAY MORNING.

The Publisher cannot be responsible for DRAWINGS, TESTIMONIALS, &c. left at the Office in reply to advertisements, and strongly recommends that of the latter COPIES ONLY should be sent.

PERSONS Advertising in "The Builder" may have *Replies addressed to the Office*, Catherine-street, Covent Garden, W.C. *free of charge.* Letters will be forwarded if addressed envelopes are sent, together with sufficient stamps to cover the postage. Unused stamps are returned to advertisers the week after publication.

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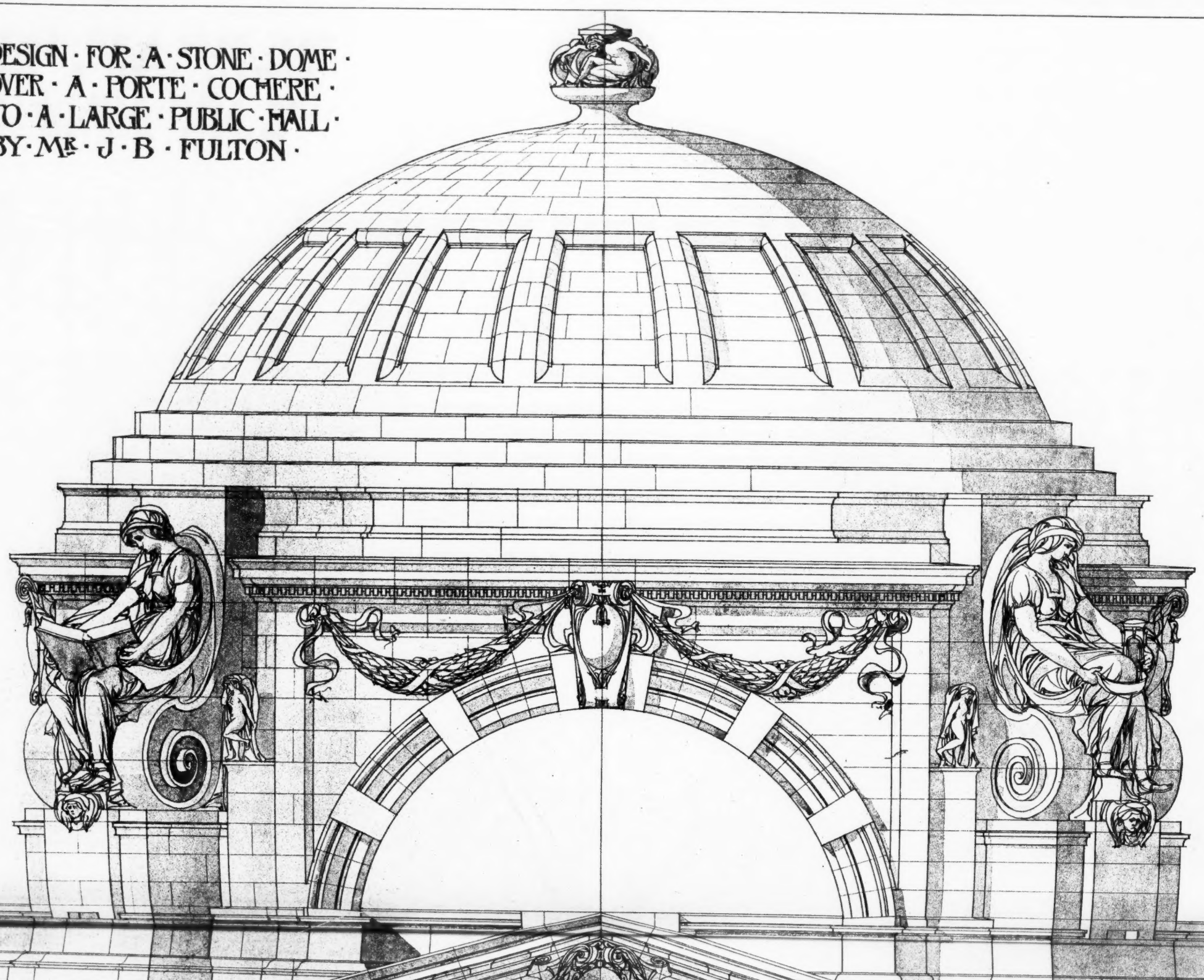

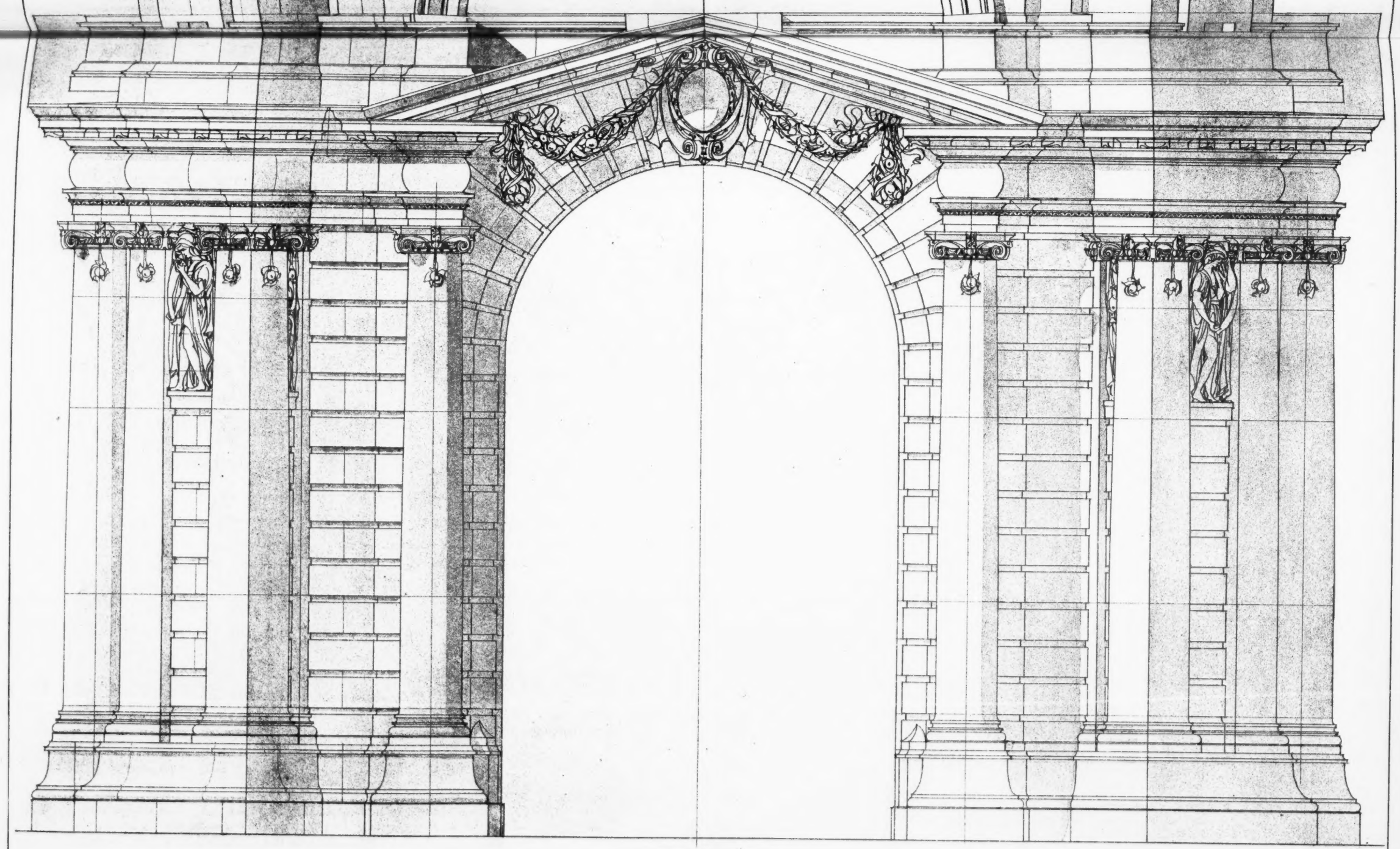

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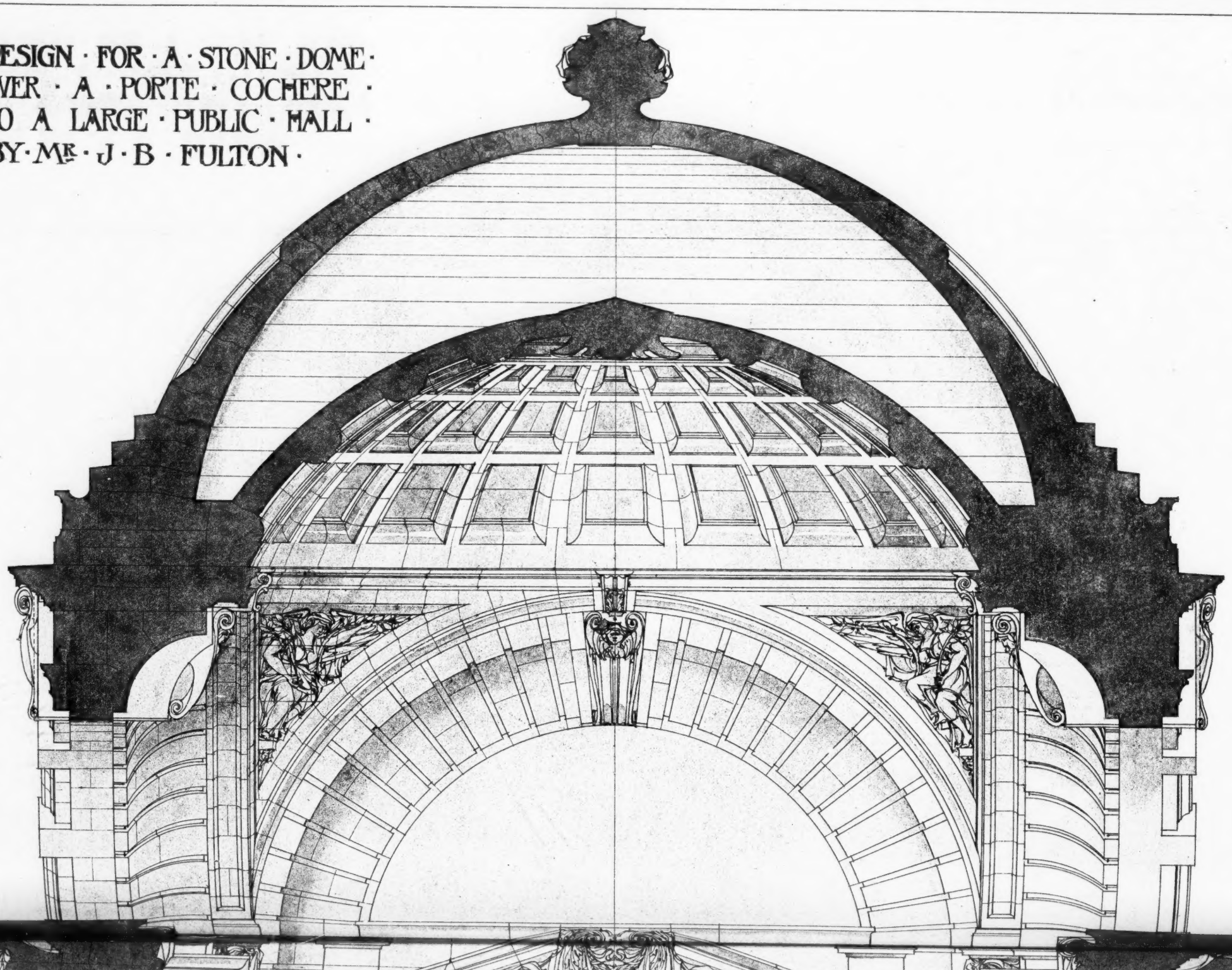
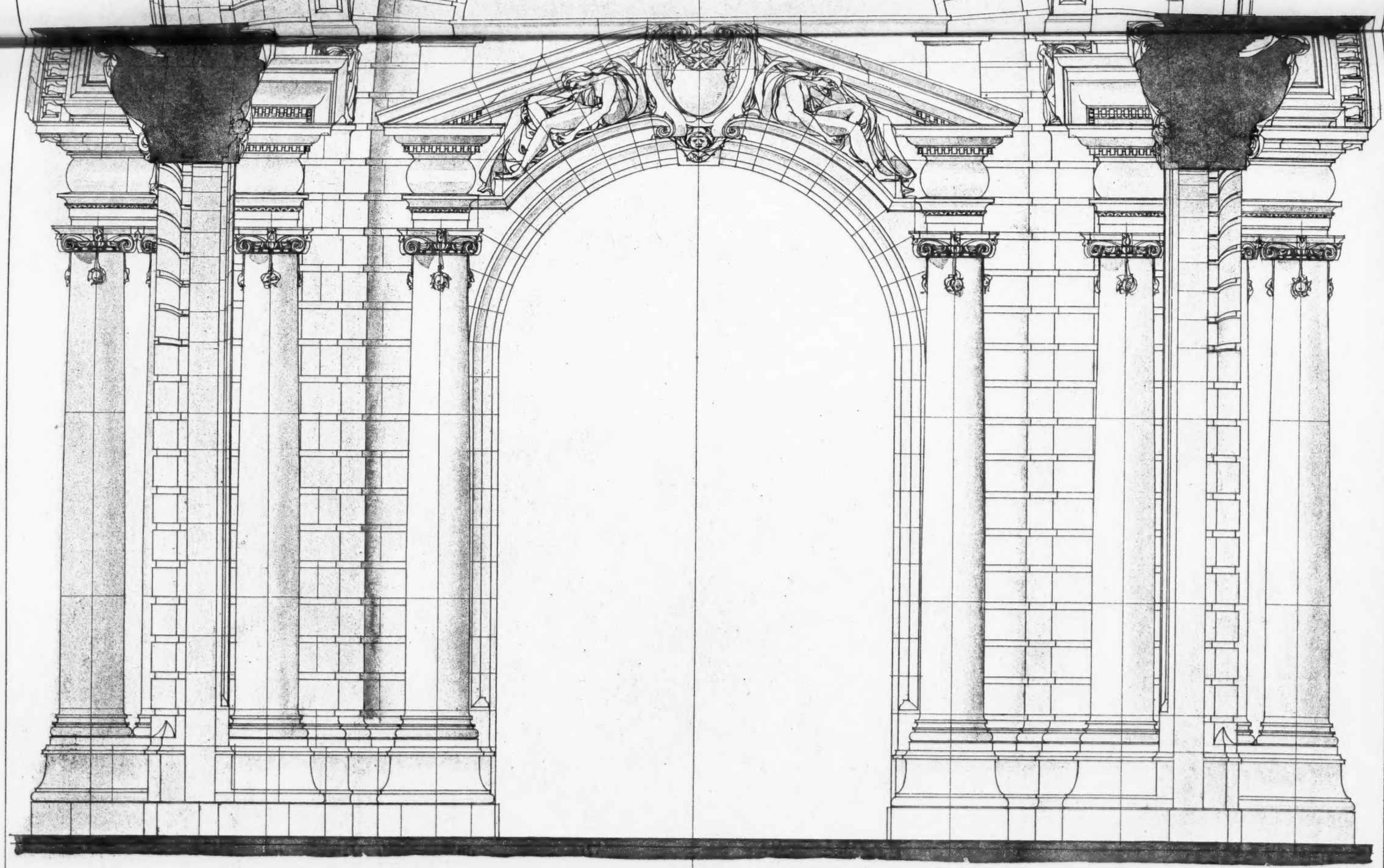
Grissell Medal, R.I.B.A., 1903.

DESIGN FOR A STONE DOME OVER A PORTE COCHERE TO A LARGE PUBLIC HALL

BY MR. J. B. FULTON





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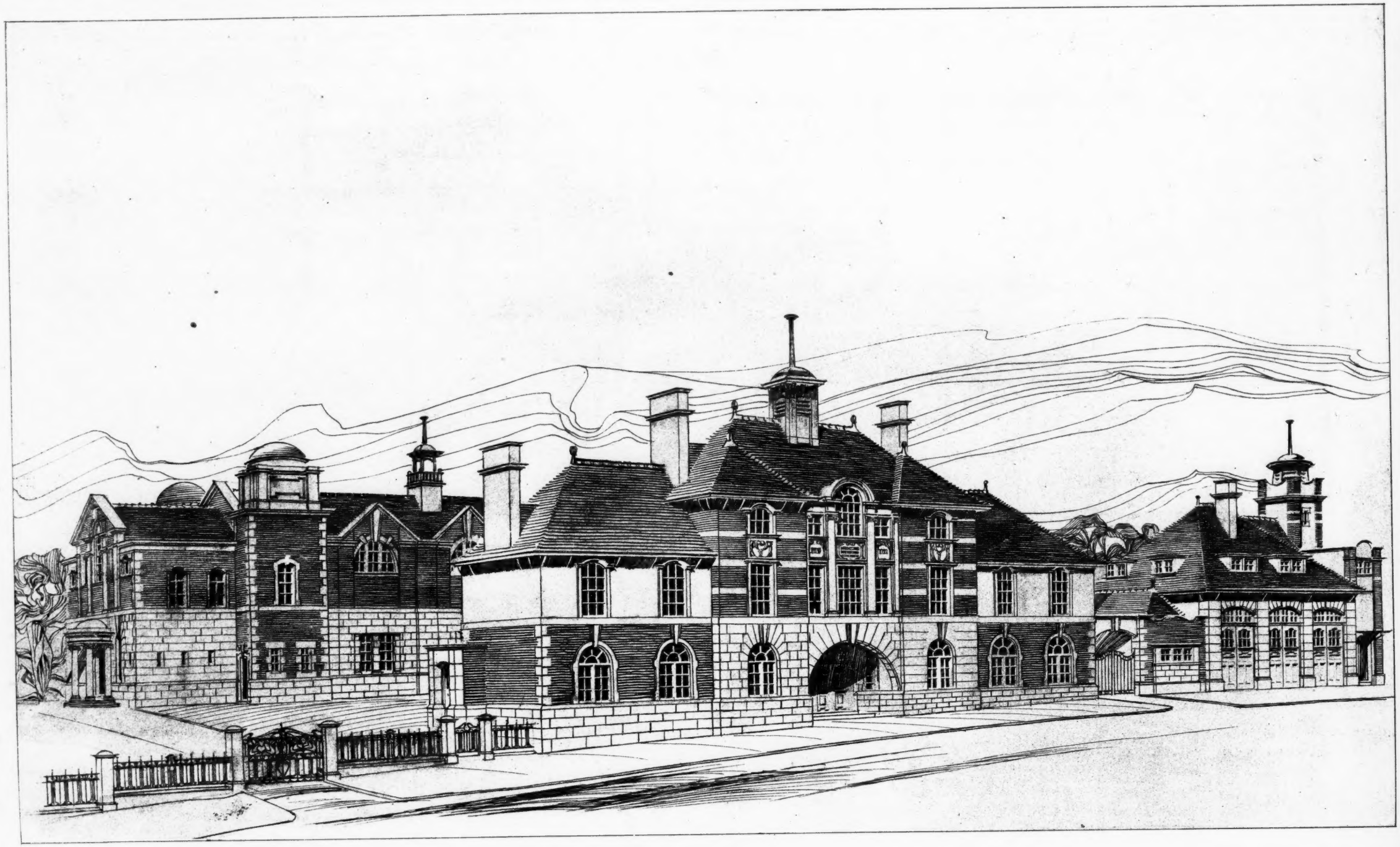

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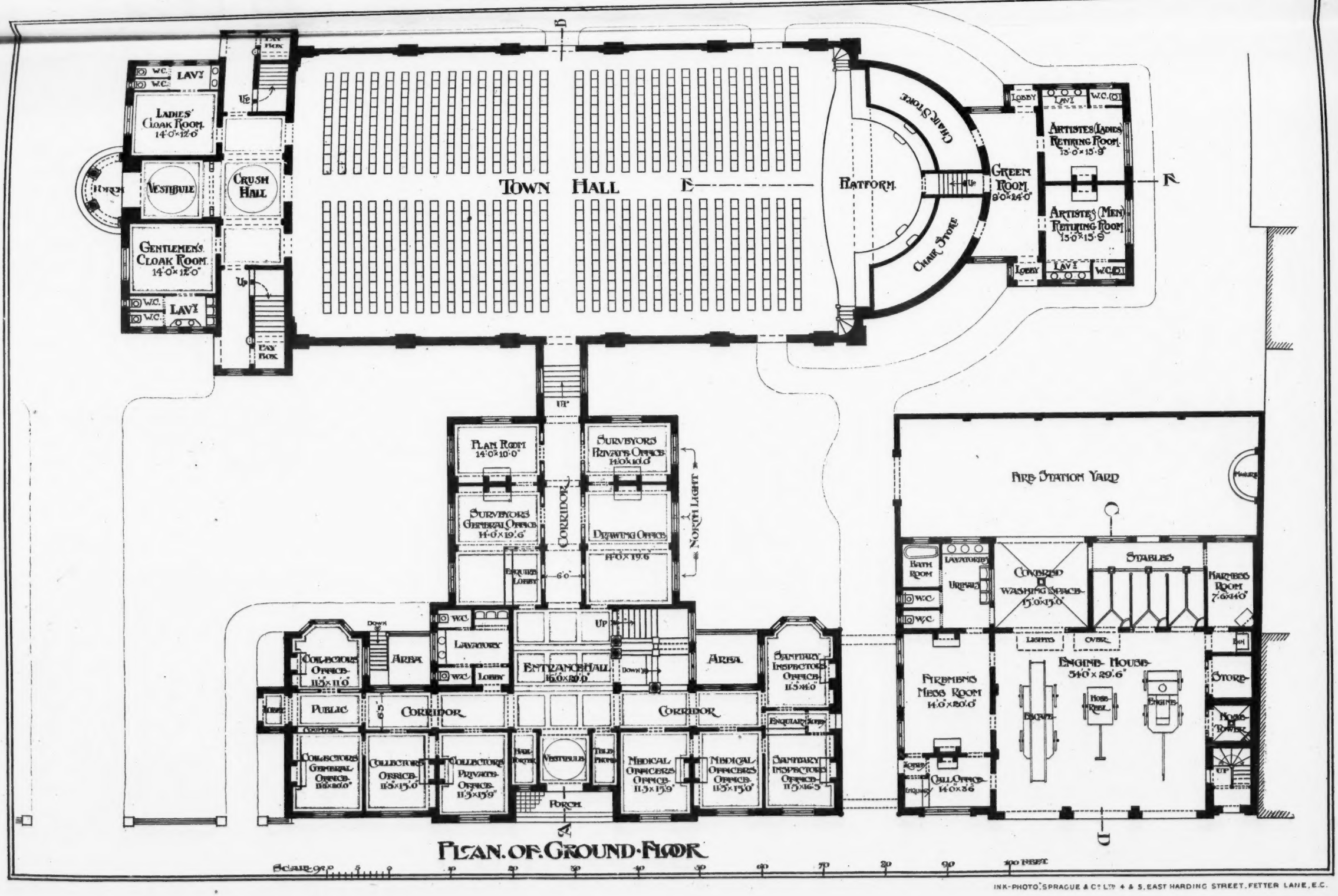

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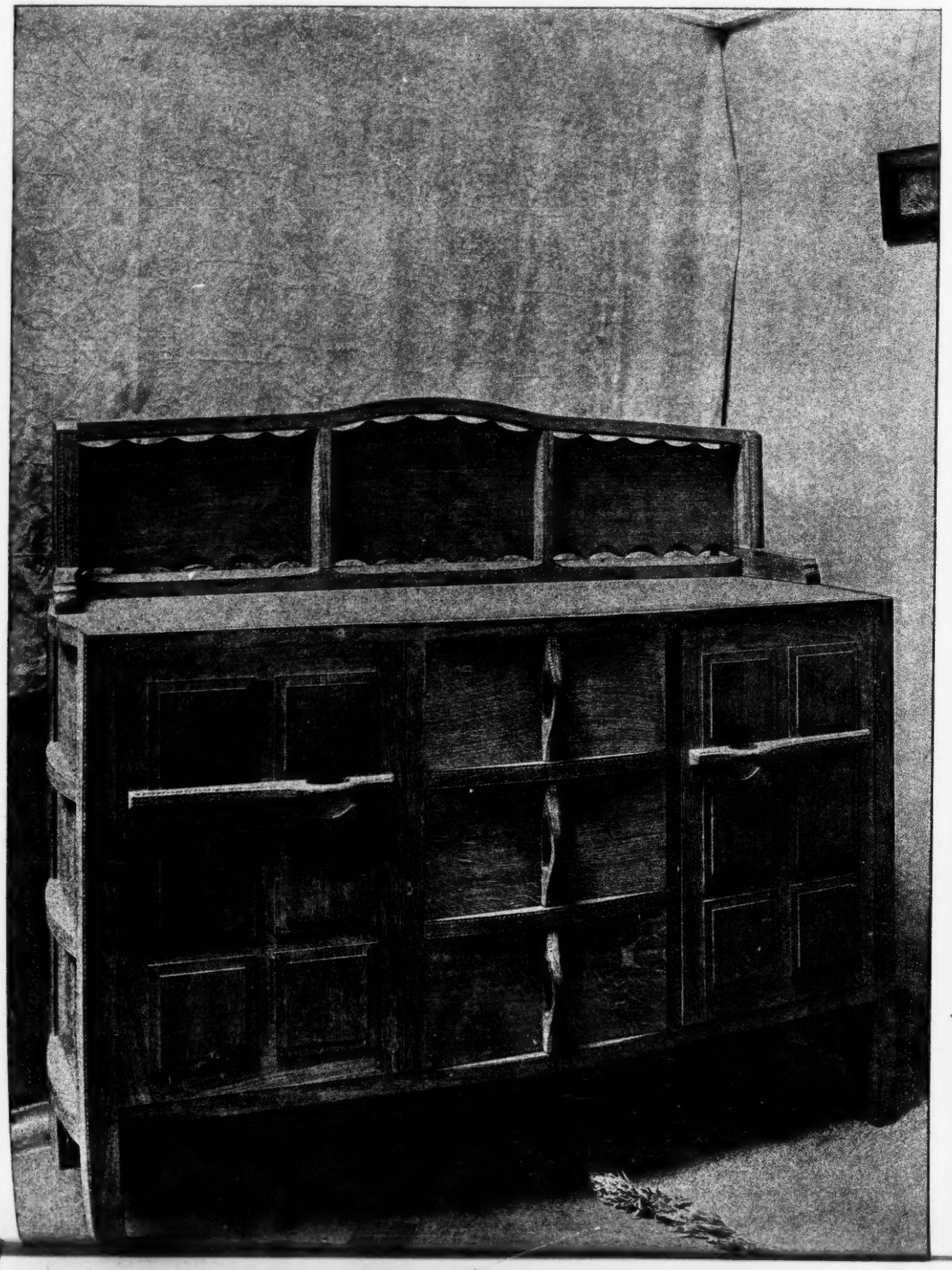
ALDERSHOT COUNCIL OFFICES.—Mr. C. E. Hutchinson, A.R.I.B.A., Architect.



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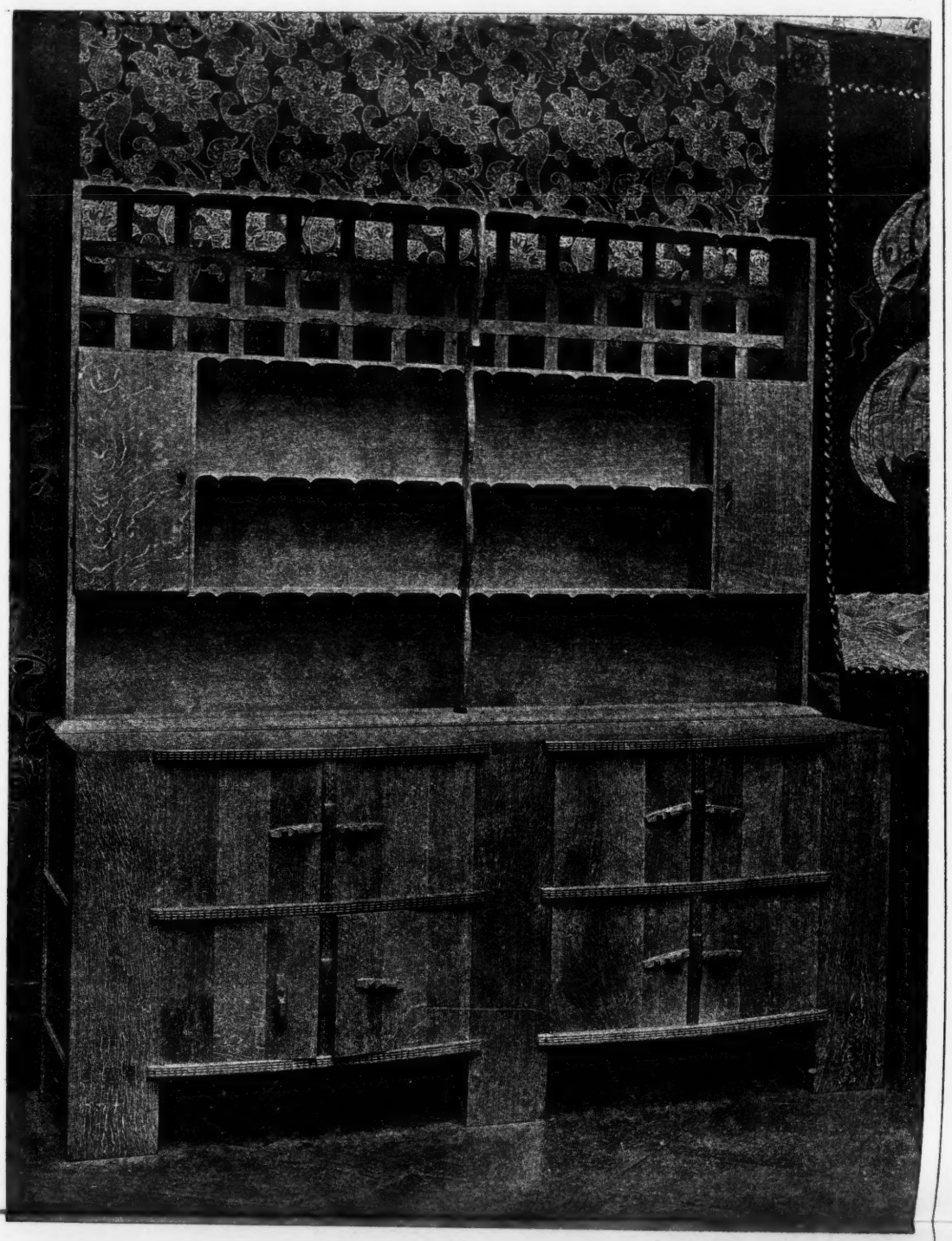

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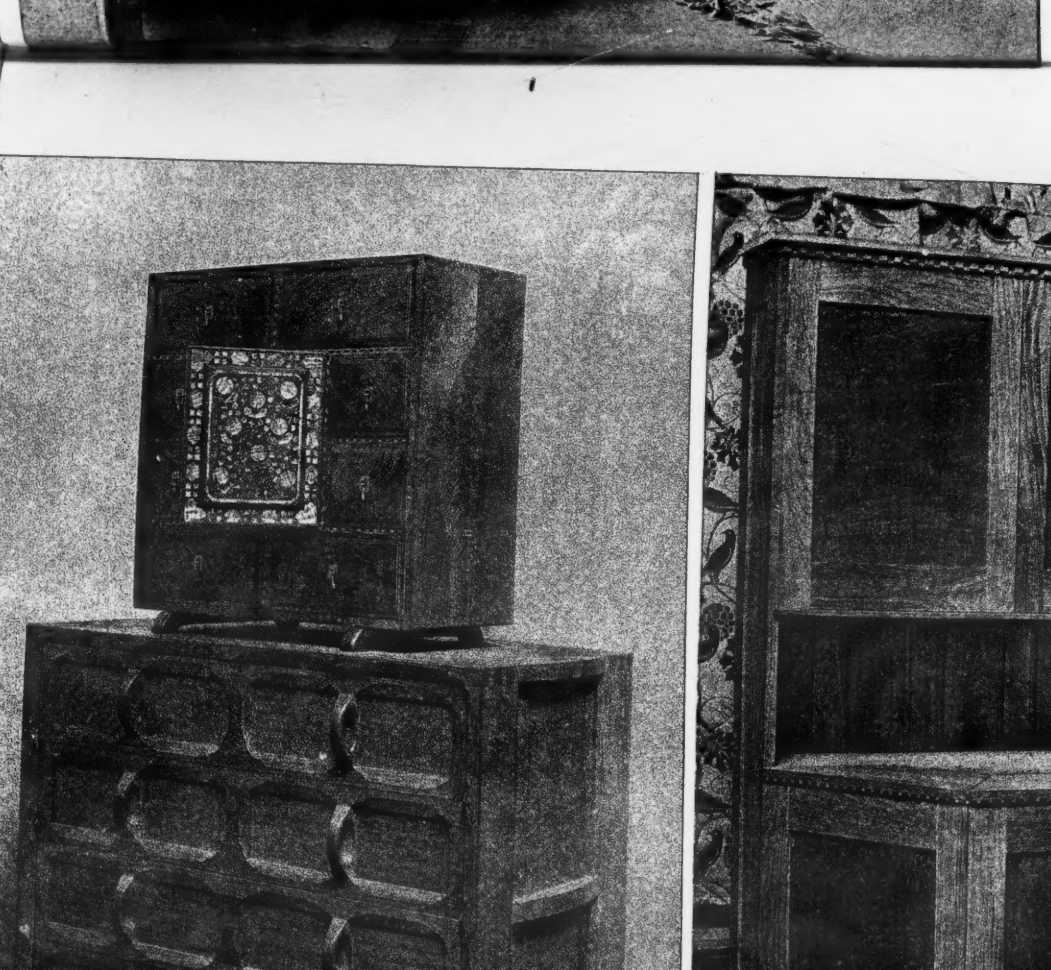

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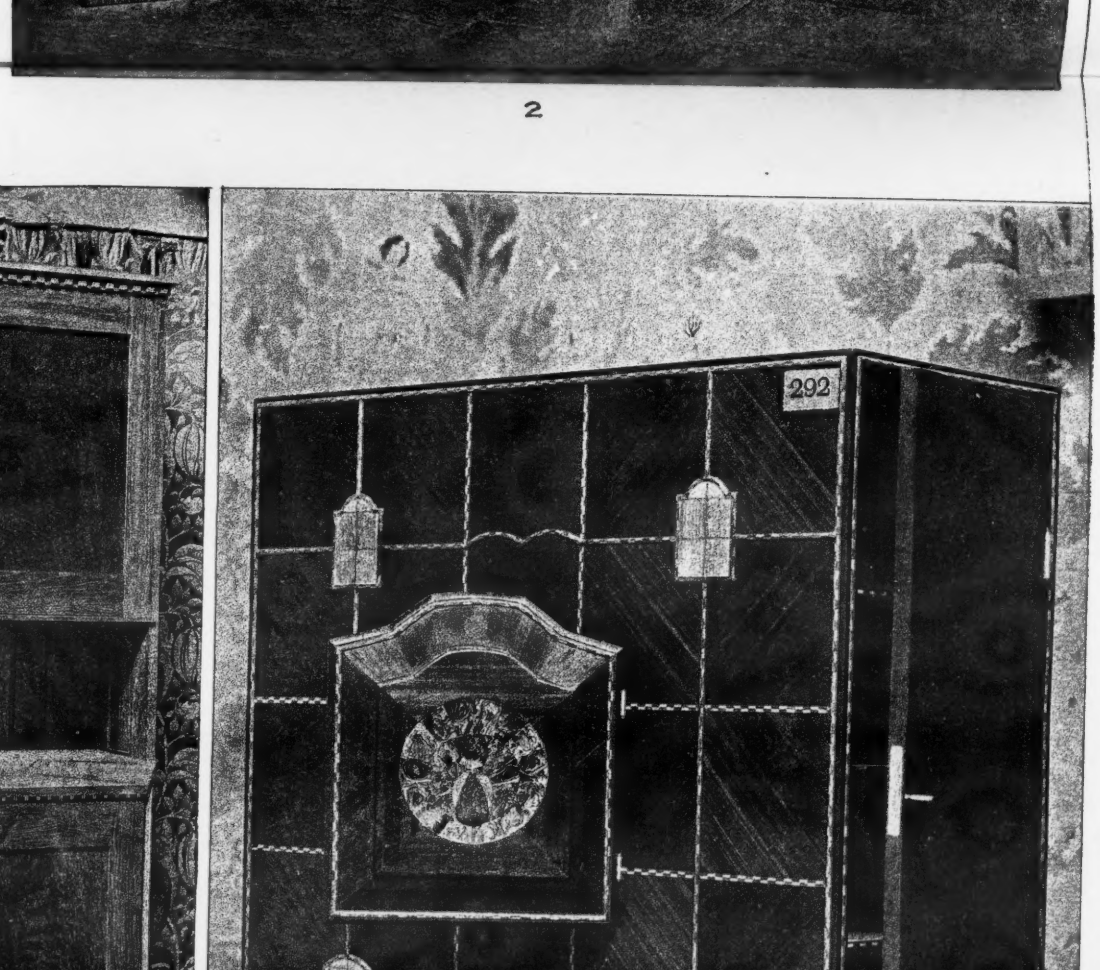

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